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Intricate Shapes Quickly Cut by Flame

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United Effort

THE colossal combination of the United Nations has made the first landing operations on the Western front successful. American and British air might and American, British, Dutch, Polish and Greek naval strength attacked as a unit. Through the months of planning this awe inspiring thrust, there is no doubt that one idea dominated all thoughts. The enemy must be attacked. All Allied might must be coordinated in this single effort. The Western nations on one side; the Russians on the other. All attacking the Axis.

What lessons can industry take from this united effort?

First, the common enemy must be recognized. In a military campaign that is not so difficult, but in our economic life it is another matter. It is not a simple task to crystallize into one concrete objective the center for economic attack.

However, if we can smash the wall of misunderstanding that too often isolates labor and management, we will have eliminated the distrust with which these two groups so frequently eye each other.

From what does this distrust stem?

Employees accuse employers of appropriating a disproportionate share of the wealth of the nation to which they contributed in no minor manner.

Employers, in turn, feel that workers, especially when organized and now government, too, are usurping management's functions, and leaving it hamstrung in making vital decisions.

This infection of distrust must be cauterized. The economic problems we shall face will have to be approached with new, fresh attitudes. Old prejudices must be excised. Surely when the varied thoughts and aspirations of the United Nations can be synchronized to a common purpose, it should not be impossible to bring the parties together.

To support our mass production of consumer goods, it is essential that there exist a mass purchasing power. Both economic groups must cooperate in achieving this aim, from the standpoint of mutual welfare or even survival.

How can this be done?

Labor must come to realize that investments in the means of production must have a sufficient return so that productive capacity can be maintained and steadily improved and entrepreneurial initiative encouraged.

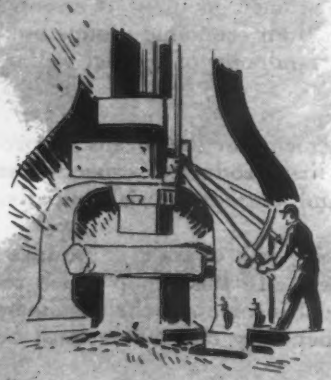
Employers will have to recognize that the bulk of what is produced will have to be bought back by wage earners. In this group which receives more than 85 per cent of our national income are the customers who finance mass consumption. The money they take home must be sufficient to allow that.

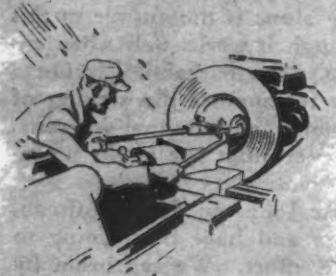
I do not think that collective bargaining alone is the answer to this problem of securing united effort even though it works well when approached with sincerity by the participants. But bargaining is not a good word for what I have in mind since it connotes the seeking of particular or party gains rather than common and mutual interests. The coiner of this phrase was perhaps not aware that one of the meanings of "to bargain" is "to haggle!"

I am thinking more of what men like Eric Johnston, Paul Hoffman, Clinton Golden and Harold Ruttenberg are and have been doing to establish a beachhead in the field of united effort. We can profit by more of this kind of thinking.

Design —

For Workability With Inland Steel





Steel offers designers and manufacturers the maximum in workability. It can be formed and fabricated by all practical production methods, keeping shop costs down. It can be formed either hot or cold. It can be easily spun or extruded into many useful shapes. Steel can be deep drawn to such extremes as in the manufacture of steel cartridge cases. It can be machined, sheared, bent, seamed, welded, and brazed. And steel is available in extreme ranges of sizes and shapes, and chemical analyses; this offers a wide scope in the design of parts, and also simplifies shop procedure, reducing wastage to the minimum.

For half a century Inland has been studying the needs of industry, working with designers and production men, to make steel more useful—to give it the workability that simplifies production and assures economical fabrication. From such close contact with field problems, Inland has given industry Ledloy, the lead bearing, faster machining steel—Hi-Steel, the low alloy, high strength steel of exceptional workability—Form-Cote, the galvanized sheet which withstands severe forming—Paint-Tite, the specially treated galvanized sheet to which paint and enamel readily adhere—and many other kinds of steel that offer numerous advantages to the designer, the production man and the consumer.

Inland engineers and metallurgists are at your service to help you design, select steel, and fabricate products for today or for the post-war period.

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The IRON AGE
JUNE 15, 1944

NEWS FRONT

► Now that the supply of magnesium balances demand, the Lathrop-Manteca plant of the Permanente Metals Corp. has been closed. Used as an emergency reserve, this plant produced magnesium by the ferrosilicon process.

Kaiser's original Permanente plant, the only carbothermic process in the country, continues in operation.

► German fighter-bombers swooping so low over the Western Beachhead, France, that their heat blasted him in the face, is reported by one correspondent in a Monday dispatch. This may be merely "dramatic" writing or it may be the correspondent's device to get through censorship information that the Germans are using jet planes. If so, this would be the first use of jet aircraft for military operational purposes by any belligerant.

► Military vehicles used in training and maneuvers are being rebuilt and put back into service. This resuscitated equipment is not only perfect mechanically but as many as 1300 modifications make it as nearly up-to-date as possible.

Nearly all the steel is salvaged and about less than one ton of new steel goes back into tanks on rebuilding.

► Predictions that civilian consumption of aircraft would reach 500,000 by 1950 have been ridiculed by E. E. Lathrop, research director of the Aeronautical Chamber of Commerce. That number can be achieved only if the utility of the airplane is materially increased.

► Over 28,500,000 tons of materials were moved overseas in 1943 by the Army Service Forces, which may be compared with some 8,800,000 tons moved during General Pershing's entire stay overseas in the last war.

Men currently are being moved overseas at the rate of 300,000 monthly.

► The manpower situation, currently overshadowed by military news, is expected to be of obvious seriousness by Fall. Any employer fretting by manpower stringency now, must anticipate far more serious conditions in the near future.

On July 1 the new employer referral system goes into effect. A male worker, of any age can be hired only through the U. S. Employment Agency or by consultation with it. Various regional and local adaptations of this potent ruling now are being devised.

► Examples of serious labor shortages in certain areas while there are surpluses (because of contract cancellations and changes) in nearby areas are mounting. Soon this mal-distribution will be increasingly conspicuous.

A secret war weapon of great life-saving potentialities is seriously behind schedule because of labor shortage. U. S. Employment Service is advertising for workers in surplus areas, but in one large city all the newspapers have combined to refuse the advertisements; in another, the Chamber of Commerce runs simultaneous advertisements asking workers not to leave as pressure will be initiated to secure civilian production for the area.

These actions were taken even when the importance of the war work was known to the newspapers and the C of C. Motivations were the holding of voters in a particular area and fear of loss of purchasing power.

► Some of those who demanded that the renegotiation clause be removed from war contracts are now not quite so enthusiastic about the success attending their efforts.

The War Department is being forced to collect far more production data and is pricing very close, since no recapture of excess profits will be possible. These factors are causing some difficulties in radar and other electronic contracts where no previous production patterns exist.

► War Department officials are looking for the new purchasing practice to result, despite all precautions, in a few atrocity cases of excess profits, which may well tarnish the entire war effort insofar as industry is concerned.

A couple of these cases may break at such a time as to have far reaching political repercussions.

New Yo

Zinc Plating of Large

By MANUEL SANZ

Engineer-in-Charge, Chemical and Metallurgical Test Laboratory, Consolidated Vultee Aircraft Corp., Vultee Field Division

ARMY Air Force Specification No. 3-100 permits painting of large structural airframe steel parts such as the ones illustrated in Figs. 3 and 5. However, it has been found more economical for the manufacturer to plate these structures because of the electrical connections that are required in order to permit electrical bonding.

When these structures were first built they were being painted. This procedure required a considerable amount of handling and masking—putting masking tape on places where clips used for electrical bonding would be attached during the assembly procedure. This was also troublesome in that after these clips and bonding connections were made, paint touch-up was required in order to prevent corrosion. As can be seen from Fig. 4, a great number of grounding electrical connections are made to the fuselage and it is very difficult to insure proper bonding or insulation in all of these places; so that, after a few days in service, corrosion would be evidenced.

A cost study indicated that plating instead of painting would prove more economical both in labor and time by making the process more adaptable for streamline production. From this study it was decided to cadmium plate in place of painting.

Space did not permit the installation of more than three tanks, one for the plating solution, one cold water rinse tank and one hot water rinse tank. Cleaning was accomplished by trichlorethylene vapor degreasing and then sandblasting, the same cleaning procedure that was being used for painting.

Although the cleaning was deficient, structures were being plated satisfactorily, requiring but a slight amount of paint touch-up for satisfactory service life.

When the shortage of cadmium was predicted, experiments were conducted on converting from cadmium to zinc plating, without removal of the cadmium solution.

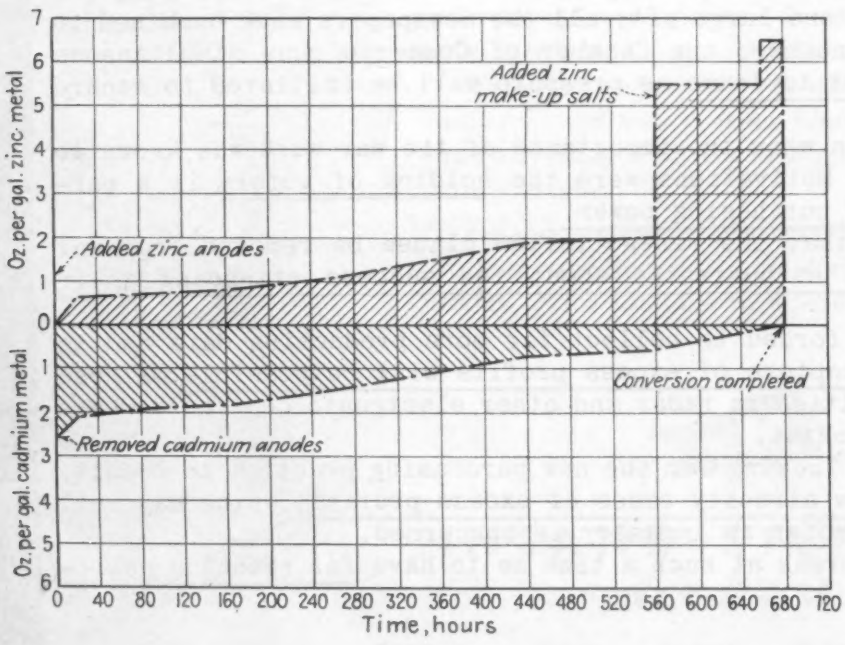
In a small pilot tank it was found that by substituting zinc anodes for the cadmium anodes, plating could be continued to the exhaustion of the cadmium salts, or until the cadmium content was so low that it could be thrown out by the addition of sodium sulfide used as a brightener or purifier in zinc plating solutions.

Fig. 1 shows the depletion of the cadmium metal in a production tank. When the content of cadmium was depleted to less than 0.5 oz per gal. as Cd, zinc cyanide, caustic soda and sodium cyanide were added to bring the solution up to the proper concentration for zinc plating.

This method was later put into operation in two of the cadmium plating tanks that were used for plating small parts. On the basis of the satisfactory results that were obtained, it was decided to convert the large 4700-gal. tank from cadmium to zinc by the same procedure. One factor that was overlooked in converting from cadmium to zinc on the large tank was that no consideration was given to the different arrangement of the anodes. This was a factor which did not seem to make any difference on the small tanks.

Because of the complex shape of the tubular steel fuselage structure, and other difficulties explained later, not all of the surface inside corners and clusters was being adequately covered with cadmium plate. However, since

FIG. 1—Cadmium and zinc content in solution converting from cadmium to zinc plating.


Added zinc make-up salts
Added zinc anodes
Conversion completed
Removed cadmium anodes
Oz. per gal. zinc metal
Oz. per gal. cadmium metal
Time, hours
0 40 80 120 160 200 240 280 320 360 400 440 480 520 560 600 640 680 720
7 6 5 4 3 2 1 0 1 2 3 4 5 6

Aircraft Structures . . .

. . . The equipment and technique employed in zinc plating of large and complex aircraft structures are described herein. Also mentioned are the cleaning and passivating practices, as well as data on changing the tanks from cadmium to zinc plating. Much of the data herein were presented before the Los Angeles branch of the American Electroplaters' Society at their recent annual meeting.

these structures required a certain amount of rewelding after plating and inspection, a 100 per cent plating coverage was not required as the painter could spray-paint the unplated areas at the same time that he sprayed the rewelded areas.

The inferior throwing power characteristic of zinc plating made the unplated areas larger and more noticeable (Fig. 6). In trying to correct this deficiency, changes were made n plating conditions that resulted in poorer plating. Practically two-thirds of the fuselage had to be painted in order to pass inspection. Large areas on the fuselage had no plate at all and others were black to gray.

When this condition was investigated it was found that although the solution had the proper concentration of zinc plating salts, cadmium oxide was being added to the tank because it was thought that this would improve the throwing power of the solution. Since sodium sulfide was also being added, this in turn was throwing down the cadmium as a sulfide and it was collecting in the bottom of the tank. Extra zinc anodes had been placed in the interior of the structure near the places where throwing power was poor (Fig. 7). This led to accidental short circuits, excessive load on the generator and burning out of the ammeters.

There were other causes that contributed to poor plating which are not discussed further but which were finally eliminated. Too often the most obvious causes for poor plating are overlooked or the blame placed on nonexisting factors. Technical reference books then become of very little help. Again, if the various causes for poor plating are mentioned, not too great an emphasis is placed on the prevention or elimination of the practical operational difficulties.

To eliminate most of the obvious causes and difficulties, a list of precautions to be observed by the operators was issued, as given below:

Plating Precautions

(1) Remove scum and foreign matter from surface of the tank.

(2) Remove traces of sand that may remain on parts to be plated after sandblasting (sand remaining on parts will lead to blistered plated surfaces).

(3) Clean anode holders periodically by pickling in acid. This is to insure electrical contact with the anode balls.

(4) Handle cleaned structures with clean rubber gloves.

(5) Clean bus bars, anode holders and electrical contacts attaching the

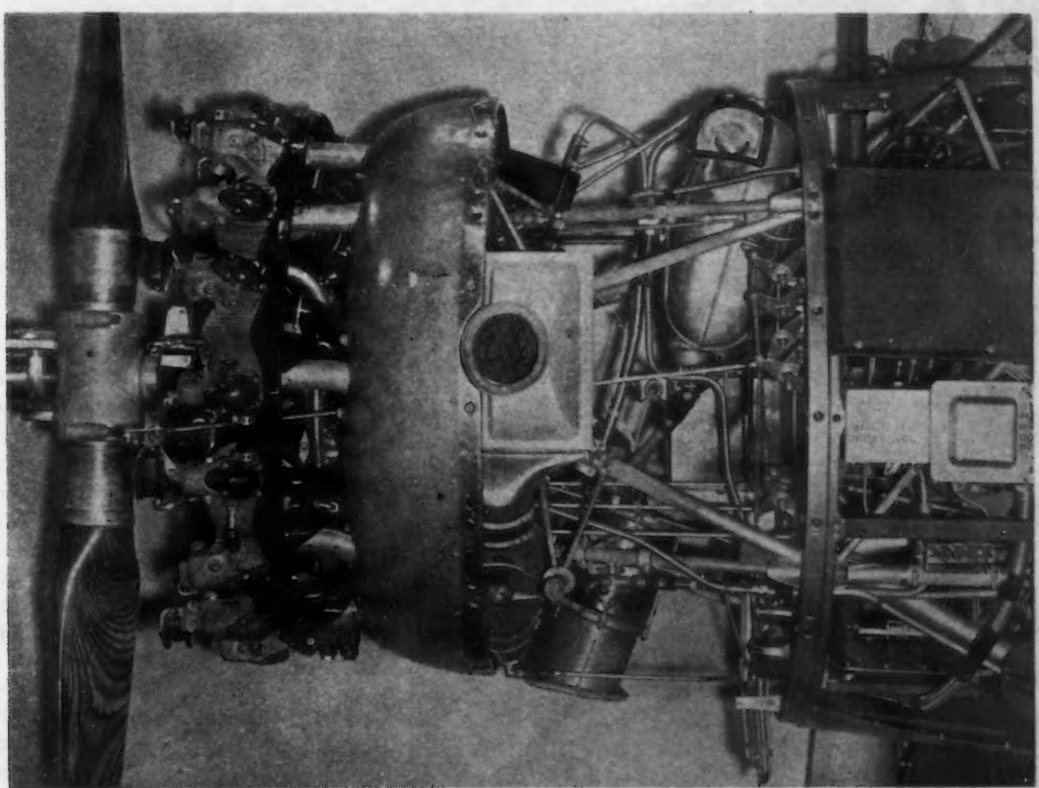
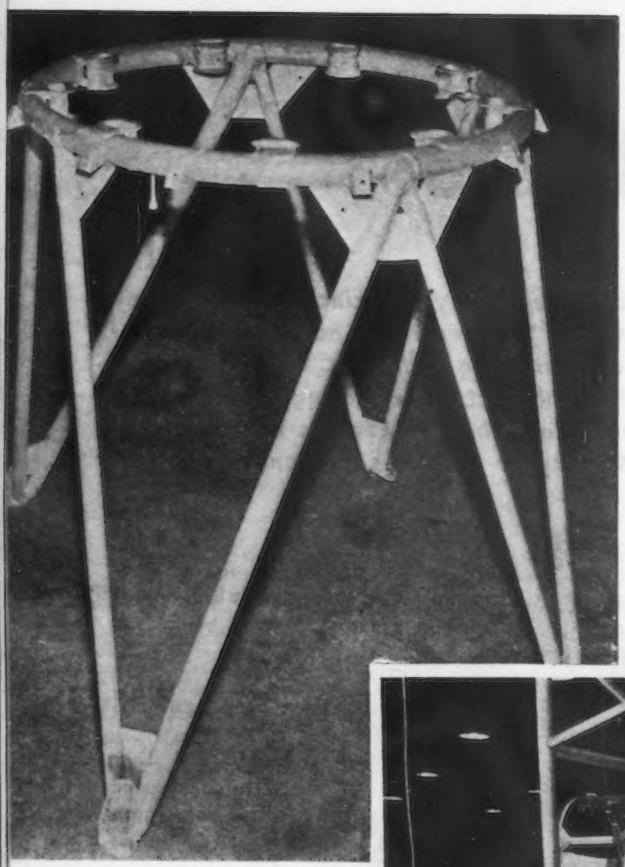


FIG. 2—Engine and motor mount assembly. Note electrical bonding connections.



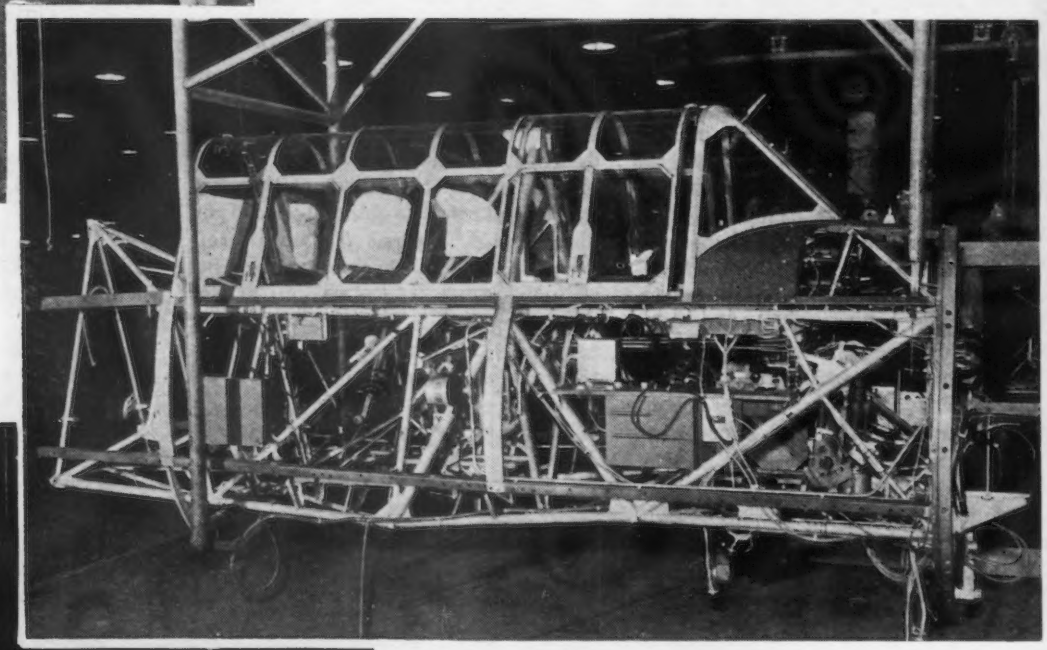
LEFT

FIG. 3—Zinc plated welded tubular steel motor mount.

o o o

BELOW

FIG. 4 — Fuselage assembly. Note numerous electrical bonding connections.



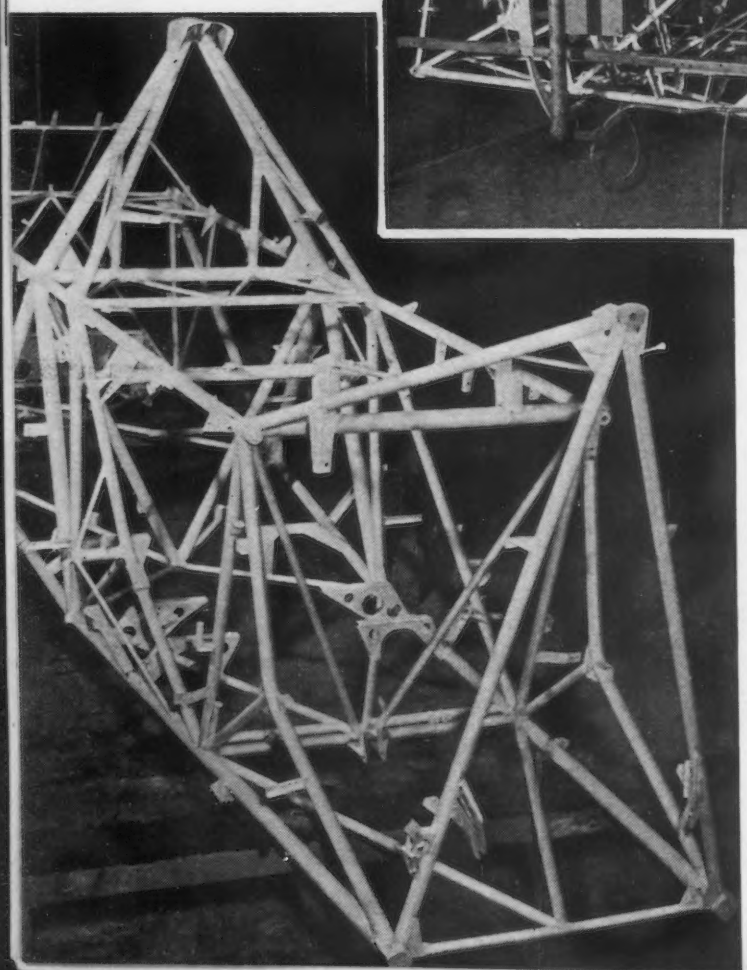


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FIG. 5—Zinc plated welded tubular steel fuselage.

work. Black anode balls indicate poor electrical connections.

(6) Insulate bare electrodes attaching parts to bus bars so that they will not act as thieves.

(7) Place anodes back as per diagram if these are removed for any reason. (Fig. 9.)

(8) Keep anode holders filled with zinc balls.

(9) Remove immediately anode holders and any foreign matter such as wires, etc. that drop into tank.

(10) Investigate immediately any irregularities in the reading of the meters.

(11) Maintain solutions at proper concentrations and at indicated levels. Make small additions of salts periodically to keep solutions near constant operating concentrations rather than waiting to make large additions which will cause undesirable low and high solution fluctuations.

o o o

(12) Add salts in small quantities at a time and stir thoroughly after each addition to avoid stratification of solutions in the tank.

(13) Do not allow metallic impurities such as copper or brass to enter the plating tank. Do not clean bus cars directly over plating tank.

(14) In adding zinc cyanide, put small amounts of calculated amount of the salt into an earthenware container and stir thoroughly, using a wooden paddle and small amounts of water before adding to the tank. If this salt is not dissolved properly the suspended particles in the solution will cause roughness and pitting.

o o o

(15) Prevent contamination of so-

lutions by thorough rinsing before transferring structures from one tank to another.

The investigation was conducted and corrective measures taken without stopping regular production.

The steps taken were as follows:

(1) The plating solution was analyzed and found to be up to recommended standards.

(2) Over the week-end the cold water rinse tank was drained, the plating solution was transferred to the rinse tank and the plating tank cleaned out. This proved worth-while as an anode holder was found in the bottom of the tank that might have been causing a short circuit. A lot of precipitated yellow cadmium sulfide was removed from the bottom of the tank.

(3) Several anodes in the center of the fuselage structure were removed and the others rearranged. The anodes on the side of the tank were moved 6 in. toward the center of the tank and short circuits that were occurring between these anodes and the brackets holding the bus bar were eliminated. The elimination of the short circuits permitted the operation of the generator at rated capacity rather than at the 175 per cent overload at which it was being operated before.

(4) The hot water rinse tank was found to be alkaline and it was neutralized by the addition of chromic acid. Caustic zinc plating salts left on the fuselage were accelerating initial corrosive attack. This tank is

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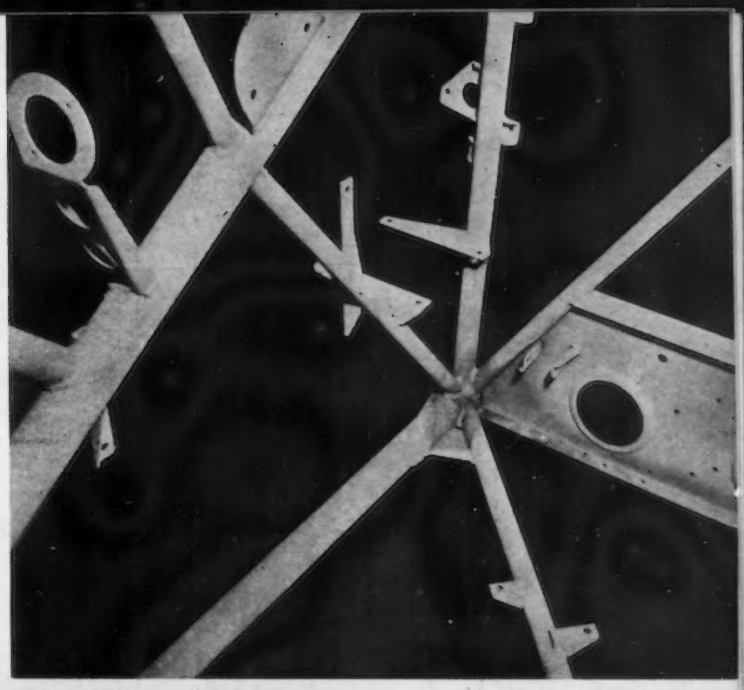

RIGHT

FIG. 6 — Note unplated area around corner.

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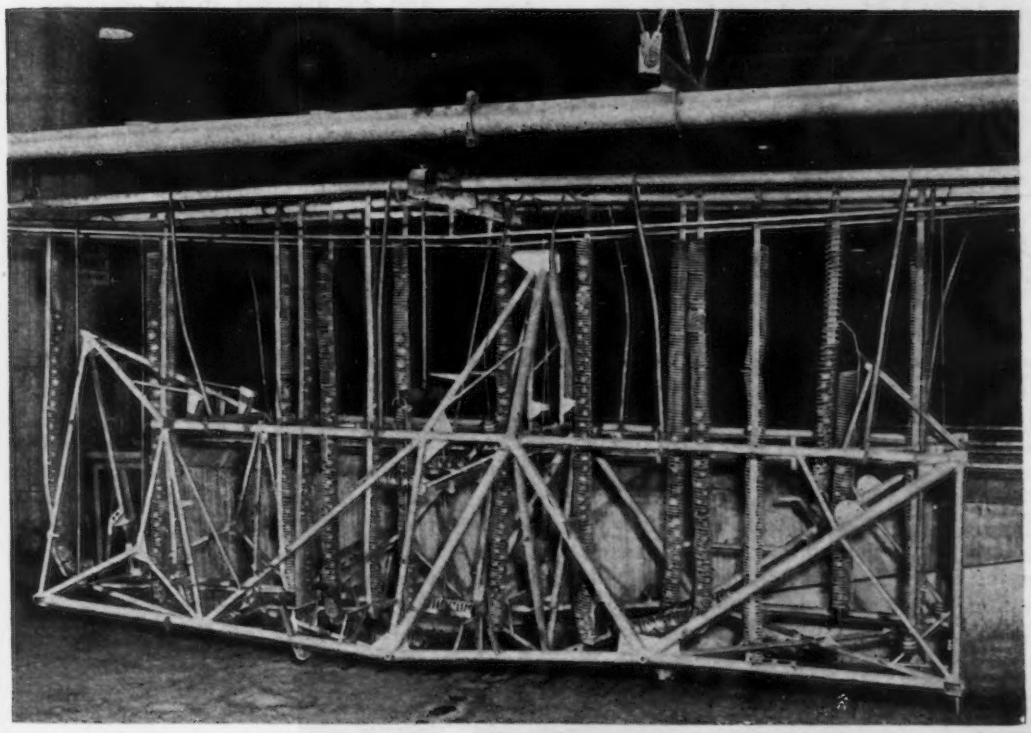

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FIG. 7 — Arrangement of anodes in the interior of the fuselage before making changes.

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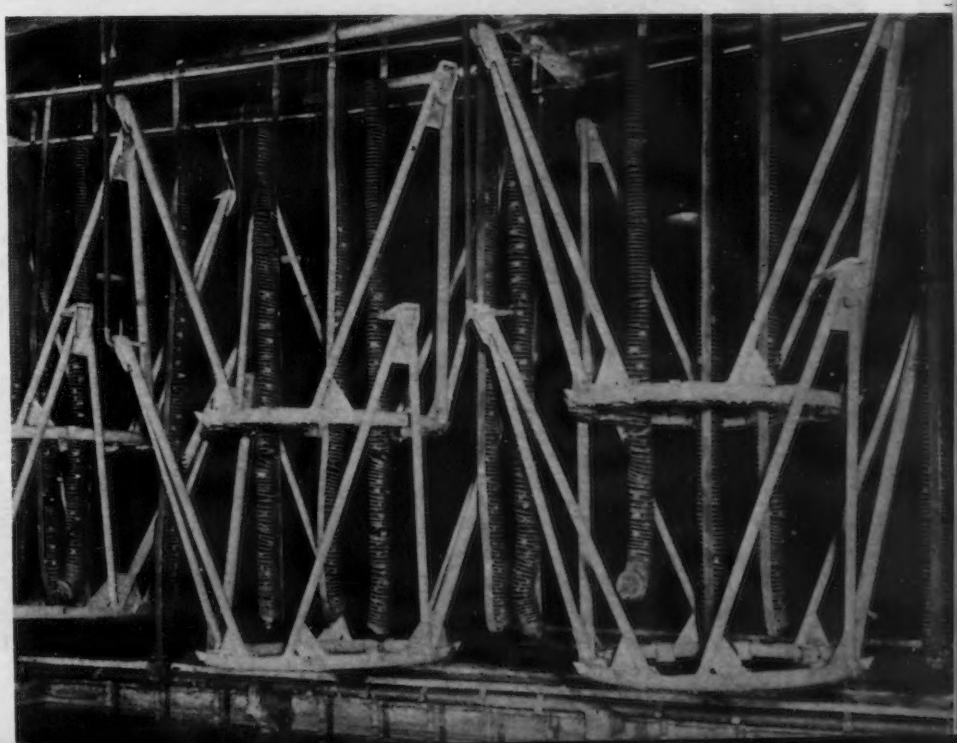
BELOW

FIG. 8 — Arrangement of anodes for plating motor mounts.



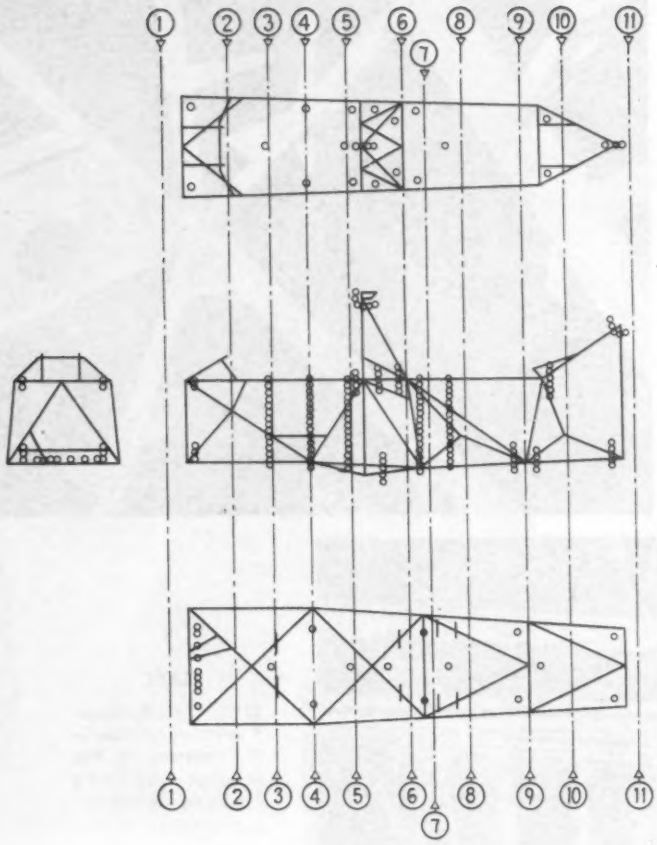


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FIG. 9—Zinc anode location chart for fuselage plating.

BELOW

FIG. 10—Fuselage after rearrangement of anodes. Compare this with Fig. 7.

now kept at pH 6.95. If space for another rinse tank were available, an exhaust system would be installed in the hot water tank and the acid content would be increased.

Cleaning Operation

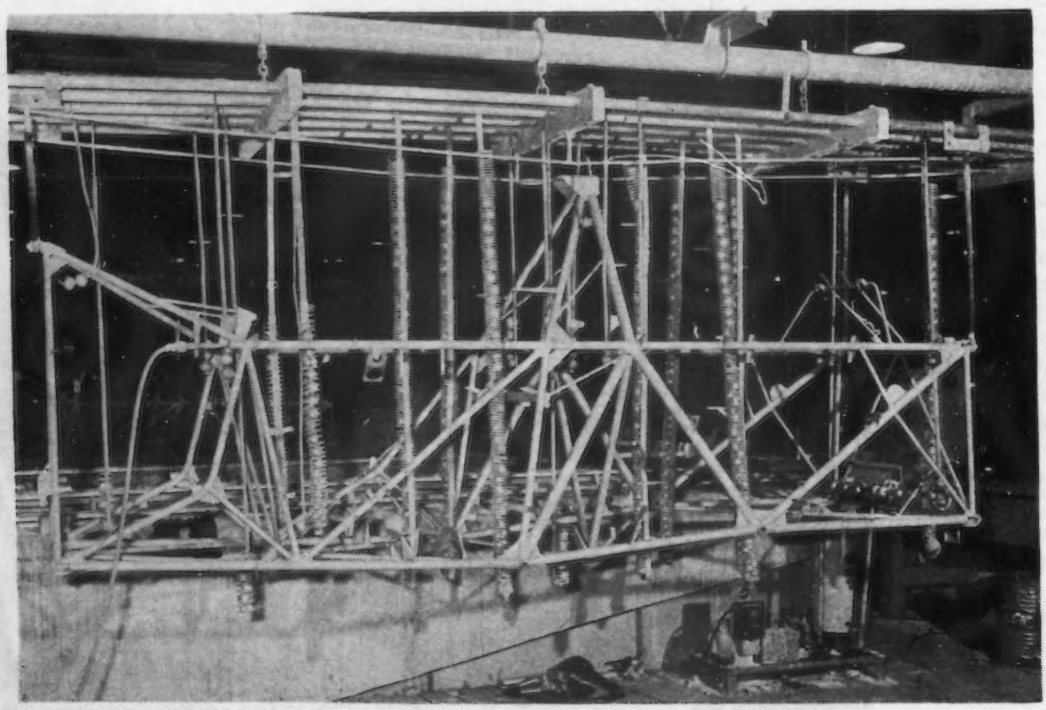
High carbon steels are harder to plate than low carbon steels; SAE X-4130 steel having 30 points of carbon is harder to plate than SAE 1010 or 1020 steels having 10 and 20 points of carbon, respectively. The higher carbon steels cause a lower cathode efficiency, that is, a greater evolution of hydrogen gas on the parts being plated.

Another factor which accounts for non-uniformity in areas where poor coverage is obtained is the condition of the steel tube as it comes into the plant from the manufacturer. Unavoidable difficulties encountered in the handling of these tubes during processing (rolling and heat treating) will sometimes lead to surfaces having an excess of carbon (carburization), which makes them hard to plate.

The recommended procedure for cleaning this type of steel before plating is given on the left side of the flow sheet of Fig. 13, while the one being followed at present, with satisfactory results, is given on the right side.

Sandblasting alone is not adequate; it gives a rougher finished surface, increasing the effective area and lowering the minimum current density requirements. Sand will also form silica gels with caustic cleaning and acid pickling and if not completely removed will lead to a blistered surface after plating. Although caustic cleaning and acid pickling is not being used in cleaning these large structures, this factor has been noticed in plating small parts where this is being used. Although the evidence so far is not conclusive, chromic acid rinsing is suspected of having a tendency to form these gels on the surface where sand has not been entirely removed.

When cleaning is deficient, the deficiency is more apparent when zinc plating than when cadmium plating. Since it was desirable to improve the cleaning and to accomplish this without the installation of additional tanks, reverse current cleaning was tried in the plating tank. A temporary arrangement was made by reversing the bus bar connections of the d.c. generator and passing 2000 amp. through the fuselage while the fuselage was used as an anode. The first fuselage electrocleaned in this manner for 10 min. was completely plated, no evidence of poor covering being evident. On the basis of this and other experiments carried on in the laboratory it was decided to order the installation of a double-throw switch to permit reverse current cleaning in the plating tank.



While awaiting this installation it was decided to electroclean the structures using the existing installation of an alternating cur-

rent demagnetizer that is used in demagnetizing the structures after plating while still submerged in the plating tank. This system operates by connecting the tank to one of the terminals of an a.c. transformer and the other terminal to be the structure. After plating, when ready to demagnetize, an a.c. current of 1500 amp. and 7 volts is imposed on the structure by turning on the switch and gradually increasing the resistance of the circuit through a variable rheostat, thus reducing the current to produce a decaying magnetic field finally shutting the current off. Although this method was not found to be as efficient as the anodic cleaning with d.c. current, it is performing very satisfactorily.

Rinsing the structure in water before plating serves to remove some of the sand left on the structure after sandblasting and to rinse the anodes that have been through the chromic acid tank, preventing contamination of the plating solution and the serious poisoning that might result.

At the end of a shift, when a cleaned fuselage is on hand and there is not sufficient time to plate it, it is put into the plating solution for storage until the next shift.

Operating Data

The solution analysis is as follows:

Plating Solution

Zinc metal (Zn)	6-7 oz. per gal.
Sodium cyanide (NACN)	15 oz. per gal.
Sodium hydroxide (NAOH)	12 oz. per gal.
Sodium carbonate (NA_2CO_3)	4 oz. per gal.
Sodium sulfide (NA_2S)	As required
Brightener "Addition O"*	As required
Temperature	75° average
Tank capacity	4700 gal.
Drag-out, approx.	160 gal. per week

*E. I. du Pont de Nemours & Co., Wilmington, Del.

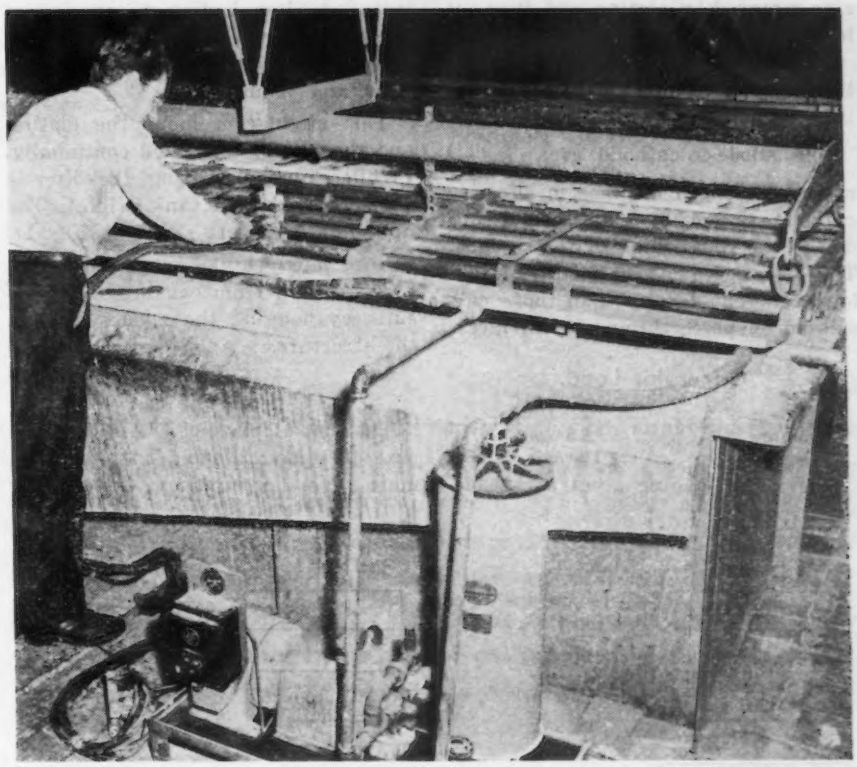
The zinc-to-sodium cyanide ratio is held at about 2.3, which gives good results at the indicated operating temperature.

One-half pint of du Pont's "Addition O" brightener was added to the 4700 gal. of solution and sodium sulfide was added as required to keep the solution at a slight turbidity.

Anode and Cathode Areas

1—fuselage, 70 sq. ft., approx.
6—motor mounts, 70 sq. ft., approx. (11.7 sq. ft. per motor mount)
Anodes (1200 lb.)—105 sq. ft. (2 in. diameter zinc balls)

The rate of anode corrosion is such that it maintains the metal content at the specified amount without additions of zinc salts, and compensates for the



ABOVE

FIG. 11—Connecting demagnetizing terminals for cleaning. Also note small filter installations.

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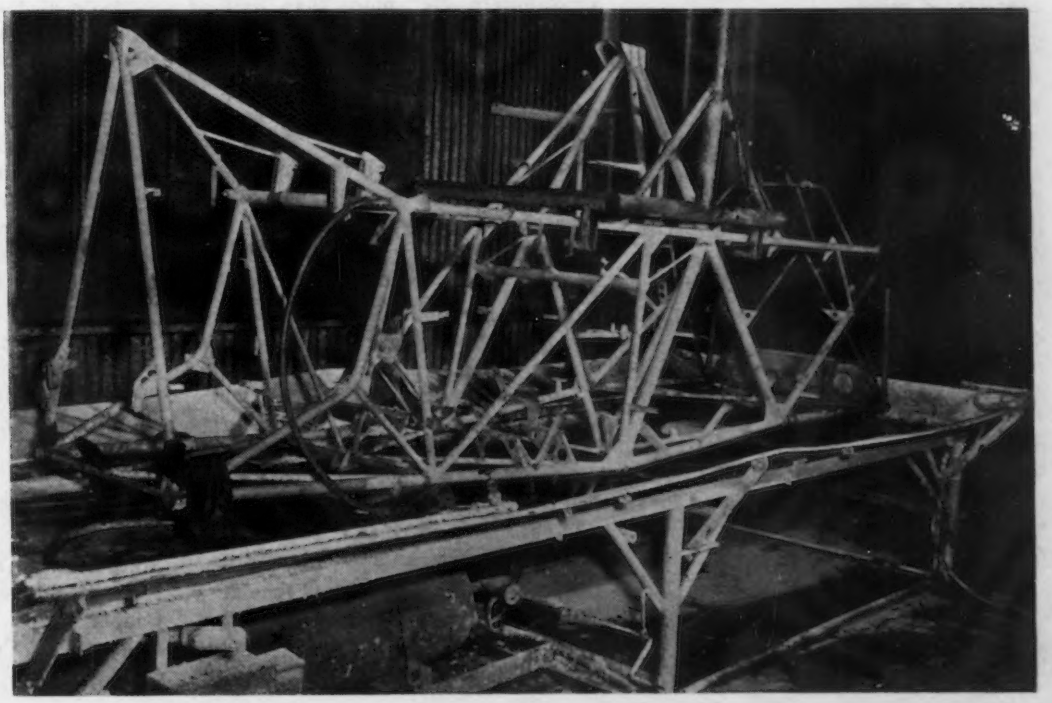

RIGHT

FIG. 12—Hot linseed oil treatment for the interior of tubes after plating fuselage. Through this same hose connection a gage pressure of 10 lb. is maintained with air to prevent plating solutions from entering interior of tubes.

zinc removed by plating and drag-out losses.

Bar anodes instead of balls were tried but were not so successful in this particular setup.

The anode-to-cathode area $\left(\frac{A}{C}\right)$ ratio is 1.43. An increase in effective cathode area results from sandblasting due to the roughening of the surface. This is equivalent to plating at a lower current density than those calculated on perfectly smooth surfaces.

Generator Load

Current ..... 2250 amp.
Voltage ..... 5.5 volts
Time ..... 50 min.

The above loading gives a cathode current density of 30 amp. per sq. ft.

Plating for 50 min. gives a plate thickness of 0.0005 in. on the thinnest plated places.

Demagnetizing

Current ..... 1500 amp. a.c.
Voltage ..... 7 volts

As stated before, advantage is being taken of this installation to clean the structure electrolytically before plating. Its intended use, however, is to demagnetize the structures after plating since during plating these structures become magnetized, and would cause considerable trouble if demagnetizing were not performed at this state. Later, after the airplane is fully assembled, a small growler is used to correct for compass deviations. When structures are not demagnetized in the tank the work that has to be done with the growler in the field is doubled.

Stirring and Filtering

Stirring is accomplished by circulating the solution through a recently installed filter having a capacity of 35 gal. per min. circulating the total capacity of the tank in approximately 2 hr. and 30 min.

This circulation helps the plating and the filter is operated continually. (While cadmium plating, the filter is only used when the tank is idle). The filter and pump are shown in Fig. 11.

Care must be exercised to prevent the agitation from causing short circuits by banging the anodes against the structure.

Cost

The cost of plating is less than the cost of spray painting but would be more than dip painting. Considering the cost of metal, the drag-out losses, labor and power, the cost of plating with zinc was estimated to be approximately 40¢., more than half of this being the labor cost. Plating with cadmium would cost about twice as much. The reason that plating is cheaper than spray painting is that over half of the paint is wasted in overspray when painting relatively thin tubes, and that the labor cost is greater for spray painting.

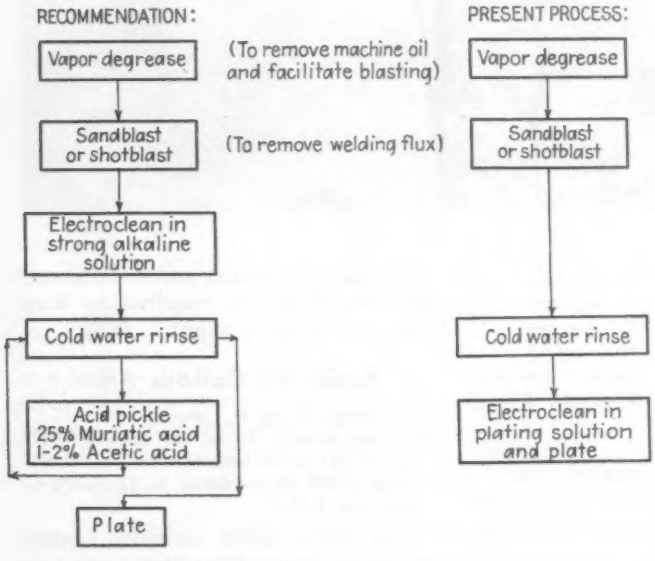

FIG. 13 — Flow sheet of plating process.

After Treatments

The Army and Navy Specification AN-P-32 Amendment No. 2 requires a passivating treatment after plating to inhibit corrosive attack on white zinc corrosion products. The proprietary treatments authorized by this amendment are the Cronak (1) the Iridite (2) and Anozinc (3). (Only a cold chromic acid rinse is required for cadmium plated parts and structures.)

At present the zinc-plated fuselages and motor mounts are receiving a hot water rinse with just enough chromic acid to keep the solution slightly on the acid side (pH 6.95), but the possibility of installing either the Cronak or the Iridite process is being considered should space for the additional tanks be made available.

Details on the three passivating processes are as follows:

(1) Cronak process, Technical Service Bulletin, March 20, 1942 (revised), issued by the New Jersey Zinc Co. The process is covered by U. S. Pat. No. 2,035,380.

(2) Iridite process development of the Rheem Research Products, Inc., Baltimore.

(3) Anozinc process development of the United Chromium, Inc.

The Cronak process which can be licensed without cost from the New Jersey Zinc Co. consists of:

(a) Double rinse in cold water after plating.

(b) Coat by immersing for 5 to 30 sec. in 26.6 oz. of sodium dichromate and 23 to 34 cc. of sulphuric acid per gal. of solution.

(c) Double rinse in cold water.

The coating is light, iridescent greenish-yellow to deep brown, of low electrical resistance, and serves as a good base for paint.

The Iridite is similar to the Cronak process except that the solution is made up with two solutions provided by the manufacturer.

This coating is olive drab, offers good electrical conductance and is also a good base for paint.

The Anozinc process developed by the United Chromium, Inc. was not considered because it is not so simple as the other two. It requires salts provided by the manufacturer and consists of making the parts anodic, steel cathodes and anodizing for 3 min. at 6 volts and 20 amp. per sq. ft. Depending upon the bath composition the coating is black or yellow.

Both the Iridite and Cronak processes require an acidproof container. The short-time treating period is advantageous from the standpoint of production, and detrimental because if the parts are left in the solution too long it will strip the plating off.

Plating with cadmium has the advantage that only a cold chromic acid dip is required to comply with the Army and Navy Specification AN-QQ-P-491.

Acknowledgment

The author is indebted to Justine Mathis and Arthur Casebeer, of the Inspection Department; and Don Cooper and E. Prono, of Development Engineering, Consolidated-Vultee Aircraft Corp.

WELDING

In Postwar Steel Construction

. . . Will arc welded fabrication replace riveted construction after the war as a result of the tremendous impetus given to welding by the present shipbuilding program? The author thinks it will. When he presented these ideas before the American Institute of Steel Construction last fall, however, there were several "Yes, but's" heard. The consensus was that welding is fine for plate fabrication, but not so applicable to straight fabricated structural steel, unless the quantities involved are large.

BY LA MOTTE GROVER

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Air Reduction Sales Co., New York

IF there is one aspect of postwar construction which is unanimously recognized, it is that competition will be very severe and that margins of profit are likely to be reduced to the point where only the aggressive constructor or fabricator, taking advantage of every modern process and development in the industry, will be able to operate at a profit.

For quite a number of years now, even the most conservative engineer or steel constructor has been convinced that it would be only a matter of a short time and perhaps a little further development, until welding would predominate in steel fabrication. That welding has "come into its own," can no longer be doubted by anyone who has been around and observed the role that it is playing in the war production of steel structures.

It is quite well recognized that, prior to the war, the main factor that discouraged a more rapid adoption of welding in structural steel fabrication was the rather drastic change in equipment, organization and training of personnel required for a full realization of the economic advantages of welding.

It has been rather difficult for structural engineers to estimate the cost of welded fabrication in the past because it varies so greatly, depending upon how well a shop is organized and equipped for welding.

It was only because of the tremendous demand for welding supplies and equipment for other war production and the consequent shortage of these supplies, attended by high priorities, that it was not uncommon to see new riveted buildings constructed to house plants for fabricating and assembling parts of ships and other steel structures entirely by welding. Riveting operations were carried on even after welded fabrication operations had started out in the open or in other buildings. The fullest use had to be made of existing facilities, whether they were the most efficient or not. As the volume of available work decreases below the capacity for welded construction, it seems reasonable to believe that welding will predominate.

Many structural steel shops have now gone over almost entirely to welding in the execution of contracts and subcontracts for ships or their parts, barges, hoists, derricks, gun mounts and various other kinds of war production. Those who have kept their plants pretty well in order and have attempted to control their costs and analyze them have become especially aware of the advantages of welding. Being equipped and organized now for welding, none of them seem to have any thought of returning to a large scale use of riveting, according to their own statements. A good example of welded fabrication for war production, which has many of the same general aspects as structural steel fabrication, is afforded by the construction of floating steel drydocks for the Bureau of Yards and Docks, U. S. Navy, illustrated.

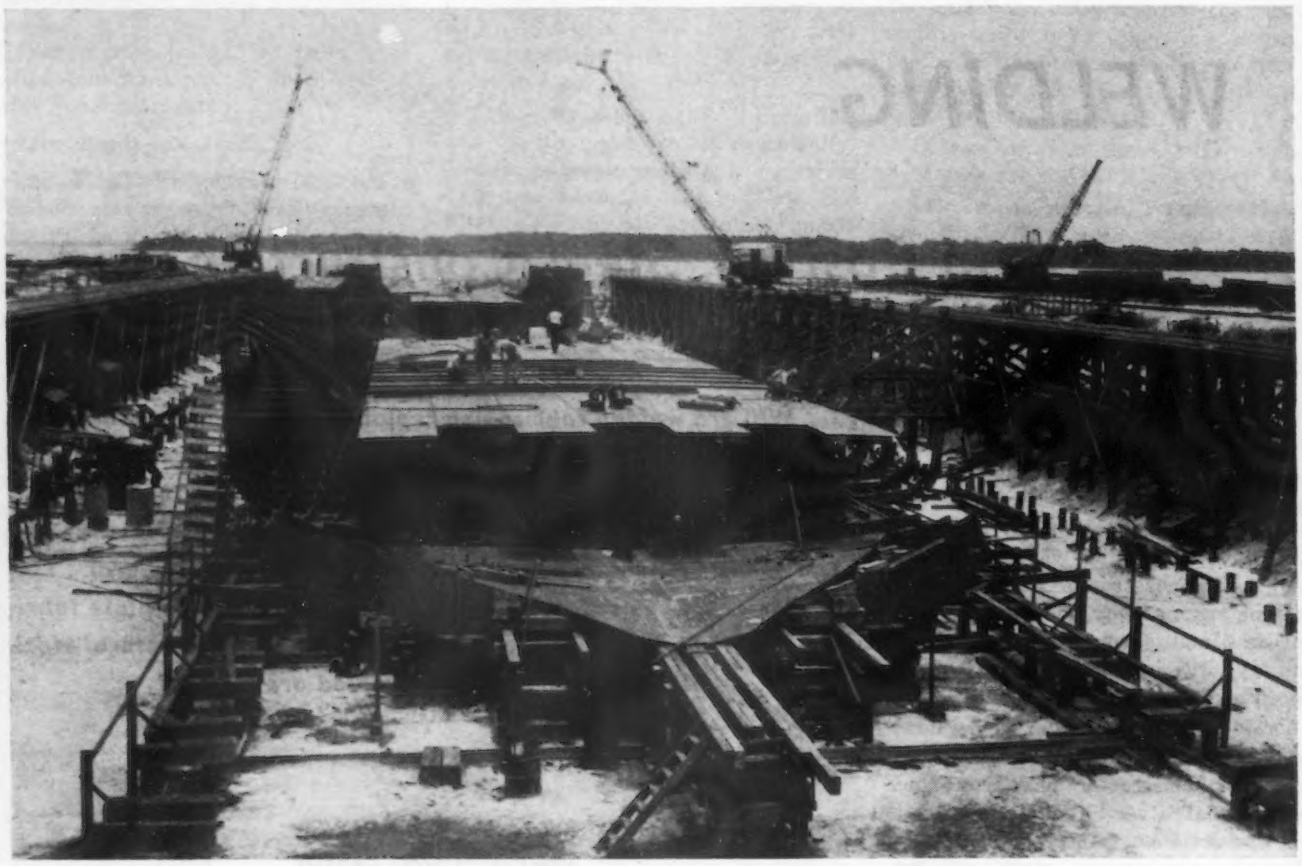
With all the new plants that have been built and equipped for welding and the older ones that have become reorganized and equipped for welding during the war, the aspect from the equipment and personnel angles is quite different now.

Personnel Problems

Regarding personnel and its organization, it is likely that most of the steel fabricating shops that have not gone over to welded war production have lost a very large part of their personnel to war industries or to the armed forces where often they have become engaged in welding. When these shops begin to build up their organizations again they will find a larger supply of men trained in welded construction than in riveted work.

Most of the shipyards that started early in the war period with an appreciable amount of riveting have continually changed to more welding and less riveting. This has been partly because of the lack of riveters and because it was found that new welding operators could be trained more rapidly than riveters.

The chief surveyor and administrative head of the British Corp. and Register of Shipping recently visited



CONSTRUCTION of floating steel drydocks for the U. S. Navy has many of the aspects of structural steel fabrication. Welding is being successfully applied here.

this country from Glasgow, where the use of welding has been less extensive than here. Their reason for not going over to welding more rapidly has been partly because their shipyards are even more congested and limited in space than any of our older yards. Also they were reluctant at first to attempt a large scale training of personnel for welding. The situation as now described by this visitor from Glasgow is that welding continues all the while to come into use on a larger scale, despite the impediments mentioned. This trend is expected to lead rapidly to all welded construction, if for no other reason than because workmen have such a strong preference for welding that almost no one wishes to enter apprenticeship or training courses for riveting.

A canvass of steel fabricating plants that have used welding extensively in our own country, especially the newer ones, would likely disclose almost no one, from the superintendents down to the newest trainees or helpers, who is not thoroughly convinced that welding is the best and most economical method for steel construction. Statements made by many of them indicate this to be true.

Another reason for the change to all-welded construction from a type which still employed a certain amount of riveting was that all-welded construction simplified construction problems, as compared with mixed construction. An example or two will be cited from shipbuilding.

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Transition to Welding

Most of the Liberty shipyards started out by riveting vertical side frames to the shell. This construction introduced a faying flange across the butt welded horizontal shell seams every 30 in. After the plate edges had been prepared for welding from both sides of the plating in the intervals between side frames, it was necessary to introduce an additional operation to widen out the grooves for the seam welding in way of the frames where the faying flanges made the joint inaccessible from the inside. The abrupt change in type of groove made sound welding very difficult at these points and the welding was slowed down. Furthermore, the bolts in the rivet holes which had been counted upon for use in laying up the shell tightly against the frames in ways of the shell seams were found insufficient in many places to enable tight rivets to be driven. Hence most of the yards adopted the system of heavily tack welding the frames to the shell. It was only logical to have the welding operator deposit the comparatively small additional amount of welding required to do the job completely and to save the punching, drilling, reaming and riveting operations.

Some yards started out with riveted longitudinal shell seams also. This added to the complications because it was necessary either to crimp or joggle the side frames to lay them up against the in-and-out strakes of shell plating, or else to fit liners or fillers for alternate strakes. In either case, frequent water stops had to be introduced to prevent leakage along the lapped surfaces between the caulked plate edges and it was difficult to drive tight rivets.

When it became more difficult to obtain or train riveters than to train welding operators the last argument for using riveting at these locations disappeared.

A new shop building intended to house welded fabrication operations might well be laid out and arranged in a somewhat different manner than for riveted work, and perhaps with some additional floor area for greatest efficiency. However, some of the

older shops that have taken up welding on a large scale, have done very well with their existing buildings and have been able to use a great deal of their old equipment to good advantage, sometimes converting it, with some modifications, to entirely different uses.

One shop, formerly rated at 3500 tons per month of mixed fabrication, (beams, columns, trusses, etc.), after rather inexpensive changes of the kind mentioned, at the present time is turning out 3000 tons of welded fabrication *per week*, or about four times its previously rated capacity. Although some work is done on Sunday and on the night shift, a very large majority of the production is accomplished on the regular day shift. Most of this work is of the kind that would require a large amount of fabrication in riveted construction.

In view of the responsibility that has come to be placed upon welding in high-pressure, high-temperature steam piping, pressure vessels, railway rolling stock, automobiles and aircraft, as well as in the main hull girder construction of ships, no one can doubt the practicability of controlling welded construction with reliability.

Ship Failures Explained

It is quite well known that some construction cracks have occurred in our ships, most of them in the plate material, and that there have been a few such occurrences, even after ships have been placed in service. In view of the rapidly accelerated expansion of shipbuilding and the large scale employment of personnel who were totally unfamiliar with any kind of mechanical or construction work, it is perhaps surprising that more difficulties of this kind have not occurred. Green personnel is still being trained in large numbers for this work, and many are necessarily advanced very rapidly into supervisory positions of responsibility far beyond their capacity and experience, although the situation is improving rapidly.

Inexperienced ship draftsmen have to be used to work out details that have an important effect upon welding procedures and the ease of carrying them out and they have to rush this work along with a minimum of thought and study. Even when changes are proposed to facilitate good welded construction, they cannot always be made promptly unless they are recognized as of paramount importance, because material has been ordered and sometimes fabricated far ahead. Designs are largely frozen to permit rapid construction unhampered by changes in design.

Drafting rooms, steel mills furnishing material, mold lofts, fabricating and assembly plants, erection crews—practically all the contributing parts to the shipbuilding program—are working with inexperienced personnel and supervision, far beyond their normal capacities, and under many other disadvantages.

Performance records of welded ships as well as other welded structures built before the war leave little doubt that the comparatively few difficulties which have been encountered can be attributed to the abnormal conditions that now prevail.

Experience in quite a number of shipyards has proved that there is no incompatability between speed and good sound welded construction. As adequate systems of control have been built up, quality and speed of production have improved together.

War industries have already produced many good welding operators and capable supervisors, probably more than an adequate supply for postwar construction, to insure quality workmanship as well as efficient production.

It seems likely that there will be a good deal of alteration and reconstruction of existing buildings after the war to convert them to peacetime industry or other uses. There are special advantages for welding in such work.

There are still a good many structural steel fabricators with limited experience in welding, or none at all, who will be reluctant to change over from riveting. Riveted work cannot be expected to disappear altogether, immediately after the war. However, the impetus given to welded construction by war production will surely result in a tremendous increase in the use of welding for bridges and buildings when normal construction is resumed.

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THIS welded steel highway bridge is typical of the type of construction envisioned after the war.

Rifle Parts Heat Treated

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THE choice of heat treating equipment is sometime a difficult matter, particularly when the requirements of the parts or components are unusual or of particular importance. However, if the heat treating production is of sufficient quantity and requires consistent physical properties, a furnace that is engineered to do the job will produce more uniform and satisfactory results than can be obtained with the usual stock equipment. Such tailored designs are exemplified by installations made by the Lindberg Engineering Co. at Springfield Armory, Springfield, Mass. Two automatic furnaces, similar in design principles, are being used for heat treating cal. 0.30 M-1 rifle barrels and cal. 0.50 machine gun barrel forgings. Another unusual type is a bottom quench furnace for heat treating operating rod handles for the Garand cal. 0.30 M-1 rifle.

The cal. 0.30 M-1 barrel blanks are roll forged to about ¾ in. diameter at the muzzle and 1¼ in. diameter at the breach. They are about 24½ in. long and weigh approximately 5 lb. each. The material is SAE 4150 steel with a carbon range of 0.50 to 0.65 per cent.

The requirements for the heat treated barrel blanks are such that a number of precautions must be observed:

(a) The temperature and time at heat must be such that reasonably complete solution of the carbides will be obtained. Otherwise, in effect, the results are the same as those that might be obtained with a lower carbon and somewhat lower alloy steel.

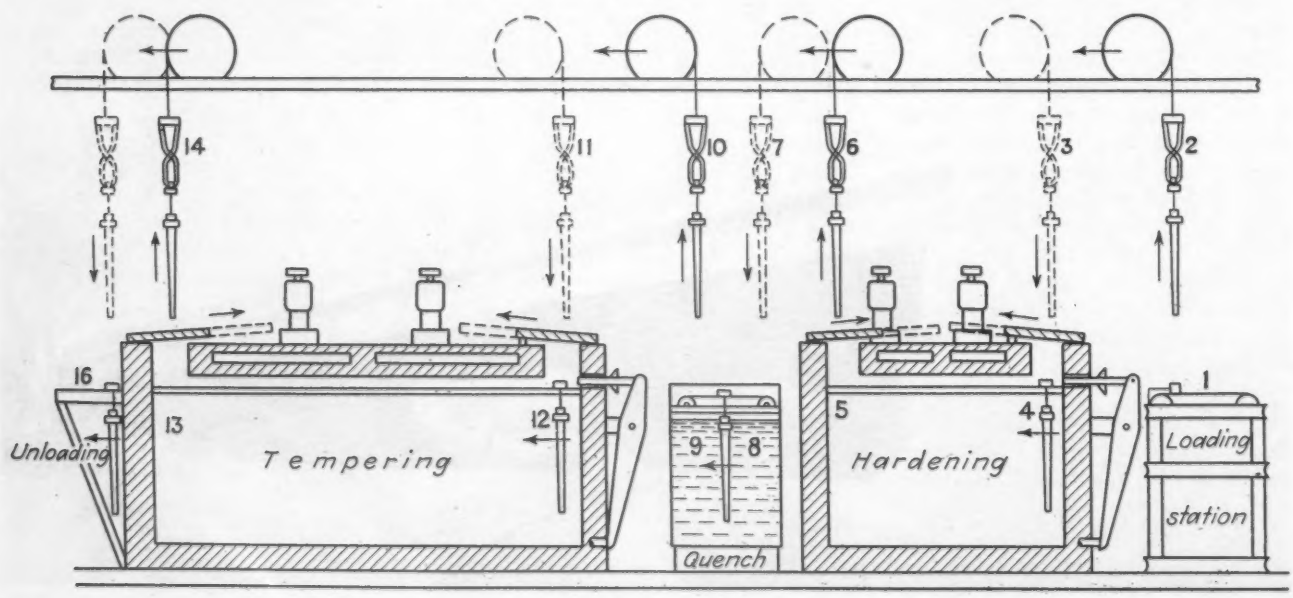
(b) The as-quenched structure must contain practically no free gummy ferrite, if machinability is not to be seriously hindered, particularly on those operations inside the barrel such as drilling, reaming and rifling.

(c) The barrel blanks should be kept as straight as possible in the heat treating process since the quality of the rifle barrel, particularly as to permanence of accuracy, is better if straightening after heat treatment is held to a minimum.

These requirements dictated the use of a conveyorized furnace with automatic time cycle controls for heating, quenching and tempering. To maintain straightness tolerances without the use of a quenching press called for vertical heating and quenching and, therefore, ruled out the conventional horizontal conveyorized heat treating and tempering unit with simple gravity drop into quench tank between. In principle of operation the furnace design worked out, Fig. 1, is a cross between a series of mechanized soaking pits and automatic conveyorized plating tanks in which racked work is automatically lifted out of one tank and put in another successfully.

The barrel treating unit is 50 ft. long, 13 ft. and 19 ft. high. It comprises a high temperature (1750 deg. F. max.) 100 per cent forced convection hardening furnace, a quench tank equipped with pumps and cooling system and a forced convection tempering furnace (1250 deg. F.

FIG. 1—Diagrammatic sketch of the vertical rifle barrel heat treating unit at Springfield Armory, showing from right to left, the loading station, forced convection hardening furnace, oil quench tank, forced convection tempering furnace and the unloading station at far left.



In Special Furnaces . . .

. . . A description of two unconventional units installed at the Springfield Armory, one for automatically heat treating barrel forgings, the other an unusual bottom quenching furnace for hardening operating rod handles of the M-1 Garand semi-automatic rifle without distortion or scale.

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max.). The forced convection principle was selected because of its accuracy of control and uniformity.

Cycle Control

Four timing devices control the operation of the complete unit: The first controls the main cycle of the furnace and determines the length of time in the hardening and in the tempering furnace. The second controls the time delay between removal of the hot blanks from the hardening furnace and their entrance into the quenching bath. This is an effective means of preventing quenching cracks and lessening distortion, particularly when quenching high hardenability alloy steels such as those used for barrels.

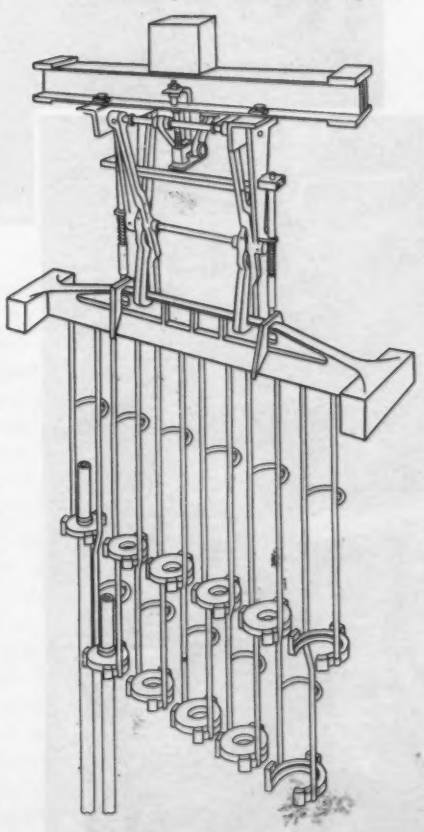
The third timing device controls the length of time in the quenching bath. The quench oil has a very high volume of circulation and its temperature is automatically controlled. The fourth timer controls the length of time between the removal of the blanks from the quench bath and their entrance into the tempering furnace. The barrels are removed from the quench while still quite warm and a quick transfer to the tempering furnace is effected. These controls are readily adjusted at the control panel. During the entire cycle the work is suspended vertically in hangers attached to heat resistant carrier beams, shown in detail in Fig. 2. This sketch also shows the tong arrangement used for picking up the carriers and lowering them into furnaces or quench tanks.

Loading of barrels in the hangers is illustrated in Fig. 3. These accommodate eleven cal. 0.30 rifle barrel forgings or six cal. 0.50 machine gun barrel blanks. Two short lengths of endless conveyor chain move the loaded carrier beams to a point directly below the first set of lifting tongs. This horizontal movement is controlled by limit switches connected in series so that if the carrier beam is placed on the conveyor chains at an angle, the condition is corrected automatically. As one end of the beam approaches and contacts its limit switch, its forward movement is checked, allowing the other end to catch up with it.

Interlocking Limit Switches

Referring again to Fig. 1, during normal operation, the lifting tongs hold a loaded carrier beam suspended from the carriage in position 2. The timer actuates the carriage, moving it to position 3 where a limit switch stops it when the loaded rack is centered above the door of the forced convection hardening furnace. At the same time a second limit switch opens the door of the furnace, which in turn contacts another limit switch, lowering the beam into the furnace. As the beam is deposited on the rails in the furnace, contact with a limit switch is made which returns the tongs to position 3 again where three more limit switches are contacted. One stops the upward movement of the tongs, another returns the carriage to position 1 and still another closes the door of the furnace. When the carriage reaches position 1, the tongs descend, pick up another beam from the loading station and return to position 1 where it is held until the timer initiates the start of the next cycle.

FIG. 2—Sketch of pickup or lifting tongs showing how barrel blanks are suspended in hangers. They are inserted in washers and placed on the hangers.



When the beam is released from the tongs and deposited onto the rails in the furnace, a limit switch is contacted which motivates the pusher arm shown at the right of the furnace, Fig. 1, moving a beam into position 5 ready for removal from the furnace. Simultaneously this carrier beam trips a limit switch which returns the second carriage from position 7 to position 6 where the tongs are centered over the discharge door of the hardening furnace. A limit switch thereupon opens the furnace door, the action of which trips another switch lowering the tongs into the furnace. When the tongs contact the beam, they automatically grasp it and lift it out of the furnace. (See Fig. 4). Limit switches stop the upward movement of the tongs, close the furnace door and move the carriage over the quench tank in position 7. And so throughout the entire heat

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LEFT

FIG. 3—Loading end of rifle barrel heat treating unit at Springfield Armory showing carrier beams being loaded with eleven cal. 0.30 rifle barrel blanks. Two women, one loading and another unloading, attend the production from the furnace.

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treating cycle, limit switches are interrelated with timers to handle each step automatically.

The barrels are automatically carried from one step to another until the completion of the operation at position 16. Here they are removed from the rack manually and the carrier beam is automatically set onto a continuous chain conveyor and carried back to the loading station along the side of the furnace, Fig. 5.

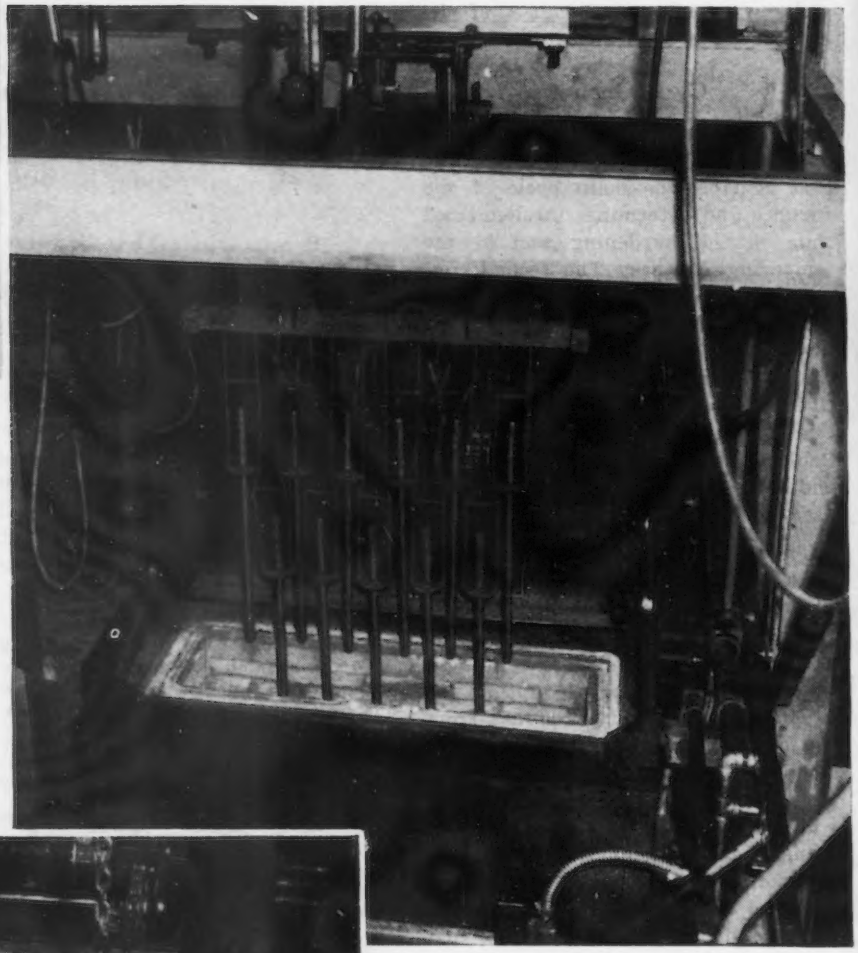

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FIG. 4—Rack full of cal. 0.30 barrel blanks being removed from the hardening furnace for transfer to the quench tank in the immediate foreground.

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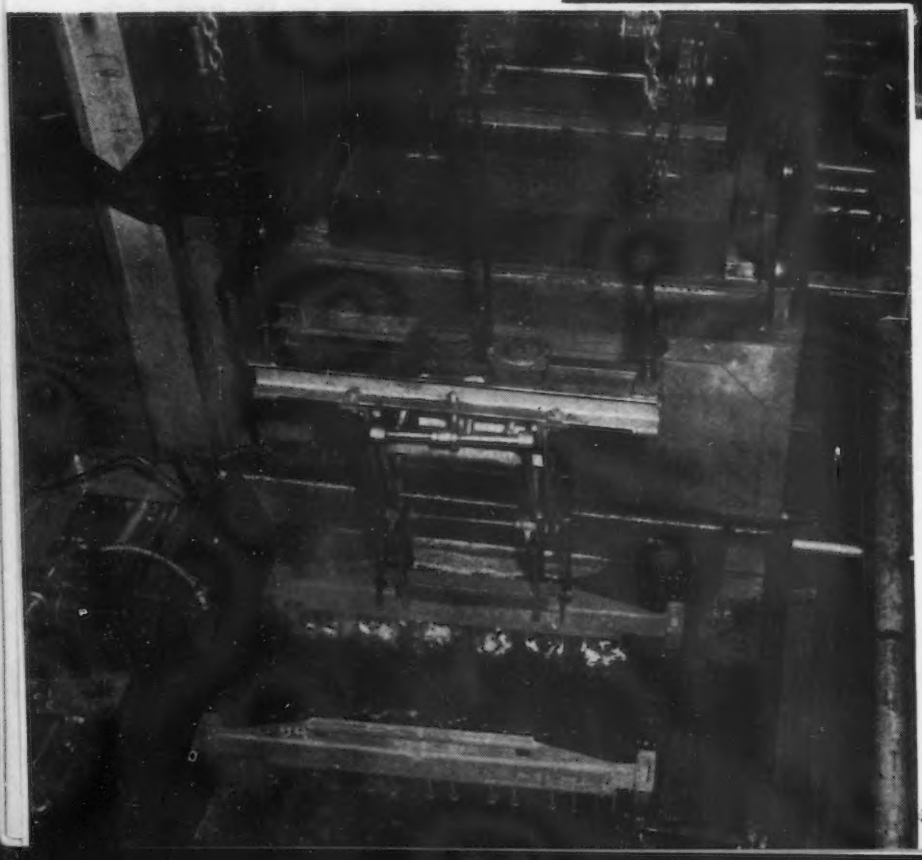
BELOW

FIG. 5—Carrier beam with its load of barrel blanks immediately after being placed in the quench bath. The beam in the lower portion of the photo is progressing through the quench and will be removed when the quench time cycle is completed.



Transfer Mechanism

The hoist carriage mechanism employs a crank principle combined with a rack and pinion gear arrangement to accelerate and decelerate the rack of barrels from one position to another. The carriage starts slowly, gradually gains momentum and then rapidly slows down but at a diminishing rate of deceleration. The gradual start and stop of the movement overcomes the tendency of the rack to swing at either end of the operation.

Since this heat treating equipment has been in service, the need for reheat treatment of barrels has practically disappeared. In quantities of several hundred thousand, it was not

RIGHT

FIG. 6—Discharge end of furnace, right rear, showing barrels being removed from carrier beam. The beams are then automatically placed on the chain conveyor and returned to the loading end of the furnace.

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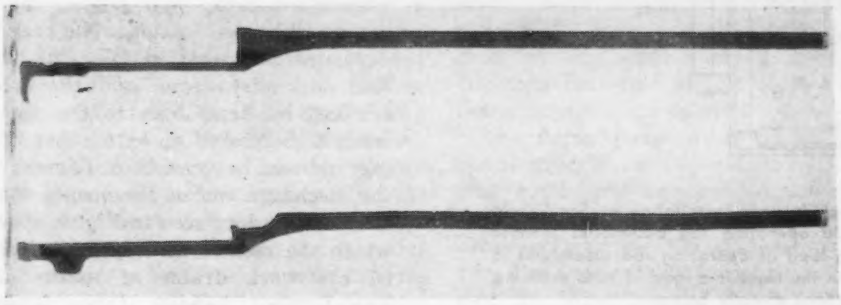
BELOW

FIG. 7—Front and side view of cal. 0.30 M-1 semi-automatic rifle operating rod assembly taken after heat treatment and parkerizing.



necessary to requench or retemper any barrels except for a few samples which were put through as pilot pieces from new lots. Physical properties are satisfactory and machinability is excellent. The furnaces have been operated at 230 per cent above their design capacity.

Two women attend this heat treating unit, effecting a labor saving over the previously used batch type furnaces of over $1800 a week. The saving in the virtual elimination of rejects and straightening time is very large compared with older methods.

Hardening the Operating Rod

In the case of the operating rod for the 0.30 M-1 semi-automatic Garand, the requirements are rather special. There are a number of wearing surfaces which must be moderately hard to resist wear, free from decarburization and, above all, free from scaling or roughening of the surface which might be caused by heat treatment. This is particularly true of the inside of the tube where the operating spring rides. In use, this component is subject to severe stresses as well as to wear. It is the link between the gas pressure from the barrel near the muzzle and the other mechanical actuating parts of the weapon.

These operating rods, Fig. 7, are made in three pieces, comprising a type 420 stainless steel piston, SAE 1050 steel tube and NE 8745 modified steel machined forging. In assembling the parts, the stainless steel piston cap is pressed against the tube under moderately controlled pressure and permanently affixed by resistance welding. At the other end, the partly machined handle forging is flash welded to the tube.

Heat treating specifications for the rods demanded that distortion be held to a minimum and that they be hardened without scale, decarb or carburization. This necessitates the use of a neutral atmosphere during the heating cycle as well as during the journey to the quench. The specifications further demanded that the rods be completely submerged in the quench 3 sec. after leaving the heating chamber. To meet these conditions an unconventional type of bottom quench furnace was designed by Lindberg as shown diagrammatically in Fig. 8 and as pictured in Fig. 9. This furnace comprises a controlled atmosphere loading chamber at floor level, a heating chamber above it and a quench tank below it. Access to the loading chamber is through a vertical lift, gasketed door.

A circular rack carrying 50 operating rods, Fig. 10, is loaded outside the furnace on a pivoted arm which is swung into the loading chamber manually upon opening the door by an air cylinder. During charging, a gas curtain prevents air entering the chamber. Simultaneously, door *D* which carries a gasket and seals the bottom of the heating chamber is lowered slightly and swung to one side of the chamber opening. Lifting rod *C* is lowered and locked to the rack by a cross rod which engages a bayonet socket of the loaded rack. The work may now be elevated into the heating chamber and the door *D* closed. While this latter door and the vertical access door are open, a circular shield *K* effectively seals the heating chamber from infiltration of quench oil vapor and from radiation losses. When the load is elevated, this shield rides to the top of the chamber on a cross pin on the lifting rod. Electric resistance elements line the cylindrical wall of the heating chamber as well as the inner side of the door *D*.

FIG. 8—Diagrammatic sketch of controlled atmosphere type bottom quench furnace especially designed for hardening operating rod handles in racks of 50.

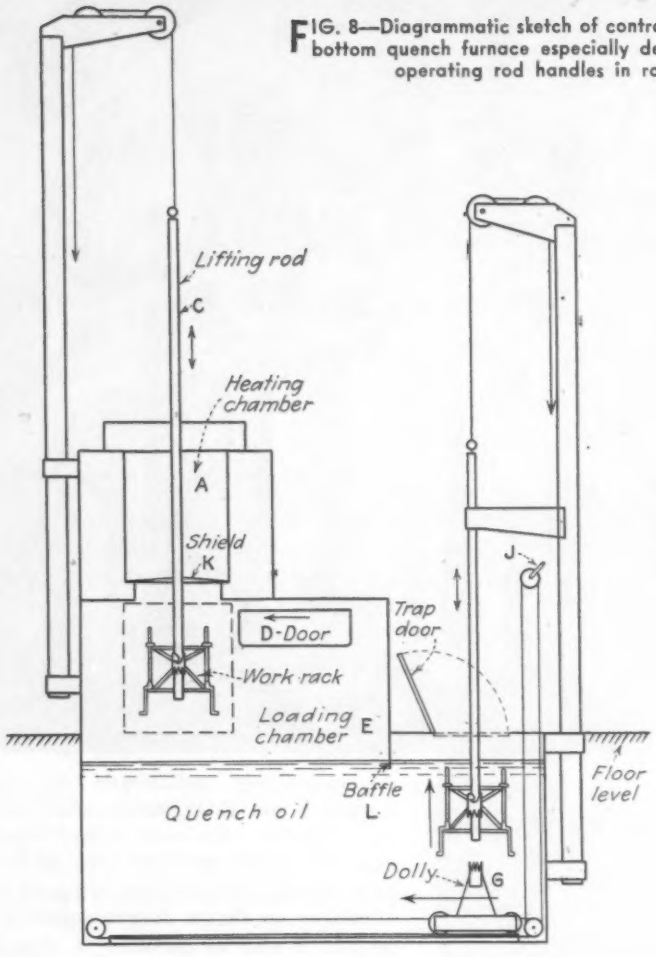


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FIG. 9—Sketch of rack for holding 50 operating rods for heat treatment in bottom quench furnace.

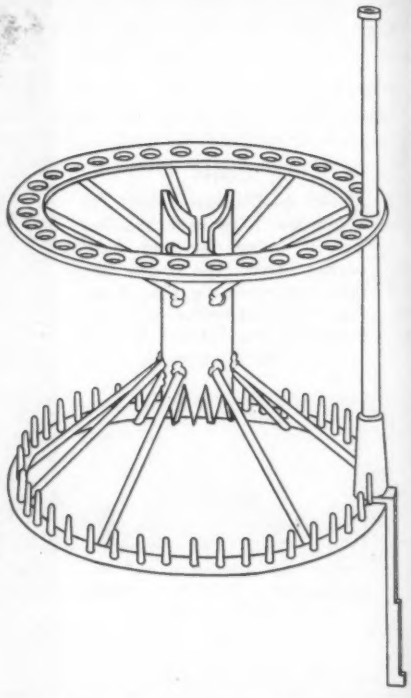
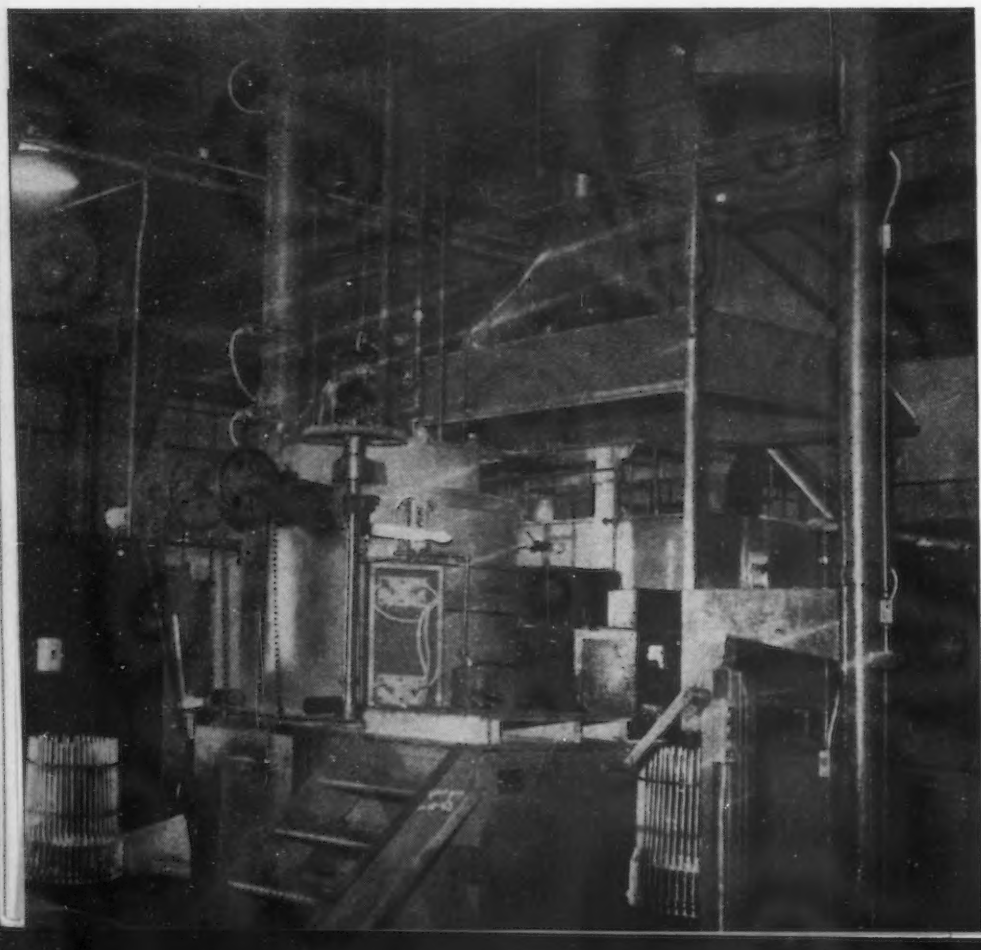


FIG. 10—Controlled atmosphere bottom quench furnace installation at Springfield Armory employed for heat treating cal. 0.30 operating rod assemblies without scale, decarb or carburization. On the left is a load of operating rod assemblies in position ready for charging into the furnace. On the right is a load of rods draining after removal from the quench tank directly below.



When the work is to be quenched, this door is again swung aside and the rods rapidly lowered into the quench oil tank, well within the 3 sec. quench specification. The rack is deposited on a wheeled dolly, the bayonet lock disengaged and the dolly cranked by hand over to the right, ready to be picked up by another lifting rod and bayonet hook. Access to the discharge end of the quench tank is by a trap door seen in Fig. 9, above which the rack is held suspended until the work drains of excess oil. The furnace handles three loaded racks an hour, including the time for charging and quenching.

Both loading chamber and heating chamber have a neutral atmosphere piped into them from a charcoal gas generator to assure scale-free hardening of the rods. The atmosphere is sealed in the charging chamber by the gasketed access door and by a baffle plate *L*, Fig. 8, which extends the full width of the furnace and is partially submerged in the quench bath. The typical scale-free neutral atmosphere analysis is:

CO_2	1½	per cent
O_2	0	" "
CO	31	" "
H_2	4	" "
N_2	63.5	" "
Dew point	0	deg. F.

The wearing surface of the operating rods come out free from scale and decarburization. Due to the fact that some air is trapped in the long tube with capped end, however, the finished components are slightly discolored on removal from the quench, Although there is not a trace of scale or roughening of the surface.

Alumino-Silicate Refractories

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. . . In concluding this article on high alumina bricks, the author discusses their manufacture, properties such as thermal expansion, torsion tests, spalling and slag resistance and applications in steel plants.

THREE principal methods are employed for the manufacture of fireclay bricks, namely: Hand molding, repressing of stiff mud blocks, and dry pressing. In the plastic process the material is generally ground in a wet pan with the necessary water and the product molded on tables by throwing, ramming and slicking off.

In the second process the clay is put through a pug mill with the necessary addition of water, extruded through an auger machine, often under a partial vacuum, cut off into lumps of the desired size and then repressed in a machine, the object being to give the desired accuracy of shape rather than any increase in density. In the dry press process, the material is again mixed with water but instead of 10 to 15 per cent of water being used only about 5 to 8 per cent is employed. The relatively dry batch is poured into press boxes and molded by means of mechanical or hydraulically applied pressure. A vacuum is sometimes applied to the press box to reduce the tendency to lamination and cracking.

The procedure as regards drying and firing of different clay bricks is much the same except as regards the precise drying and firing schedule. Thus, the bricks may be dried on a floor or preferably in a controlled humidity tunnel dryer and then fired either in periodic or tunnel kilns. The amount of grinding which the material receives, the blending of the clays and the grog addition are largely a question of the purpose for which the bricks are eventually to be employed.

Thus, for bricks which are not required to have a high thermal shock resistance but which must have great resistance to slag attack, the batch may be finely ground, the grog addition small, deairing employed and a high firing temperature used to reduce the porosity to the lowest possible figure. The use of such bricks for other purposes, for example furnace roofs or side walls, might prove disastrous due to their low thermal shock resistance. For such jobs, bricks having a higher porosity, a higher grog content and a much greater elasticity both cold and at a working temperature, are employed.

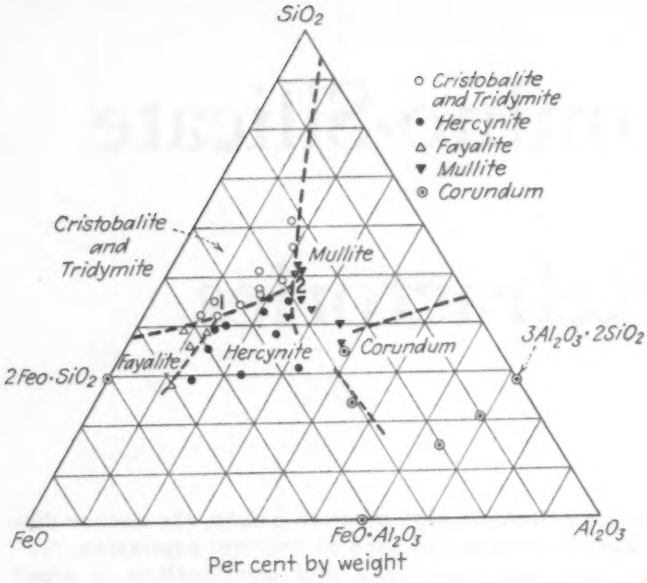
The firing temperature again depends greatly on the nature of the clay batch and on the purpose for which the brick is to be used. In the ordinary way the finishing temperature lies between 2012 deg. and 2552 deg. F., being low for the relatively non-refractory clays used in casting pit practice and much higher for clays of the 42 per cent alumina type such as are needed for the hearths of blast furnaces or the roofs of open hearth checker chambers. In the United States a notable development has been the introduction of the "super-duty" fireclay brick. The alumina content of this type usually lies between 43 and 45 per cent as compared with about 42 per cent for the "high heat-duty" brick. This difference is not great but the clays used for the super duty brick are, in general, of lower impurity content. The net effect is an improvement of as much as 140 deg. F. in refractoriness over the high heat-duty type and a much greater difference in certain other respects such as resistance to sudden heating and attack by coal ash.

Another property which is of great importance in the super-duty brick is its volume stability and its relatively low porosity which is generally below 16 per cent and maybe as low as 10 per cent. This latter is a great asset from the standpoint of slag resistance. The lack of any diaspore deposit in Great Britain has held back the introduction of this type of refractory, though bricks of equal or greater refractoriness are made by the addition of bauxitic clay to the ordinary clay batch.

Bricks are also made both in Great Britain and in the United States from a china clay base. Unfortunately, china clay, though low in iron, tends to be high in alkalies and to show a considerable shrinkage on firing. This necessitates the use of a considerable proportion of the batch in the form of pre-calcined material. The latter is prepared by passing china clay through a rotary kiln, a technique which has also been applied for the production of fireclay grog, for example, in Russia.

Although the final soaking period is of the greatest importance to the steel plant operator, there is another stage in the firing process which is equally vital if bricks having high slag resistance are to be obtained. This is the so-called oxidation period, mainly below 1832 deg. F., when the carbonaceous material in the brick is burnt out. If the firing is too rapid, vitrification of the surface layers occurs before the carbon is oxidized and a "black hearted" cored brick is obtained. For many purposes the presence of this core is no particular disadvantage but for certain jobs, as in steel ladles, it is highly dangerous. As soon as the initial face of the brick has worn back and the black core is reached, the rate of slag attack may be so great that the heart of a brick may be eaten out in only one cast. The presence in a ladle of only a few such bricks greatly increases the chance of a break-out occurring.

With high alumina bricks, by far



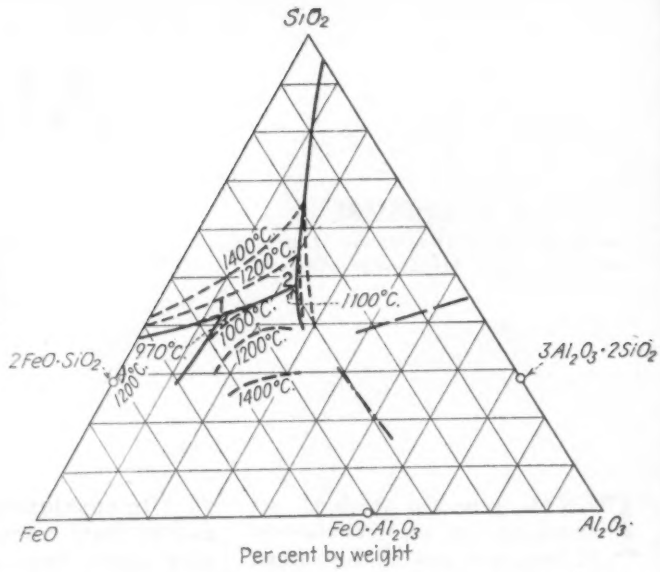


FIG. 5 (left) and Fig. 6—The FeO-Al_2O_3-SiO_2 system (after Snow and McCaughey) showing phase limits and liquidus temperatures. The low melting point materials formed when FeO is added to fireclay brick should be noted.

the greatest risk is under-firing. Thus, if a 42 per cent alumina brick is fired side by side with a 35 per cent alumina brick, the latter will be over-fired and very glassy before the high alumina brick has attained an adequate crushing strength. The high alumina brick may then show a considerable after-contraction, a serious matter when such refractories are used to replace silica bricks, for example, in the arches of checkers chambers. In general, bricks of approximately 42 per cent alumina class should not show a shrinkage of more than one-half of a per cent on reheating for two hours at 2570 deg. F.

The cold crushing strength of all fireclay bricks can be increased by harder firing but excessive heat treatment may lead to low thermal shock resistance. It can often be better controlled by a change in the grading of the batch; thus in one case an increased amount of grinding of a 40 per cent alumina clay raised the cold crushing strength from 1850 lb. per sq. in. to 5210 lb. per sq. in. The corresponding permeabilities were 0.18 and 0.0065 while the refractoriness under load (50 lb. per sq. in. fail point in rising temperature test) rose from 2678 deg. to 2840 deg. F.

The application of the X-ray technique referred to earlier in this section enables an opinion to be given not only regarding the type of alumina-silicate refractory under consideration, but also of the firing treatment it has received. Thus, a brick containing a considerable amount of free quartz in the fired state yields a photometer curve of the type shown in Fig. 9, the lines of quartz being superimposed on those of mullite. The normal medium to high alumina brick, reasonably well fired, shows the lines of both mullite and cristobalite, Fig. 10.

Bricks which have been hard fired or which contain a fair amount of alkalies show only the mullite lines (Fig. 11), the excess silica having combined with the fluxes to yield a glass.

The diagram shown in Fig. 12, which was worked out by Navratiel and Fessler, records the changes which occur when porcelain forming mixtures are fired at 2552 deg. F. Porcelain itself is essentially a mixture of mullite and glass and is normally formed by heating together clay, quartz and feldspar. The ordinary firebrick does not contain enough feldspar to form mullite and glass at this temperature but prolonged heating at a high temperature or contamination with alkalies, such as frequently occurs in blast furnaces, may result in the formation of a porcelain like material.

The diagram is particularly interesting since it shows that the ease with which the low porosity porcelain type structure is obtained decreases as the silica content increases. This doubtless explains why some siliceous fireclay bricks show less tendency to shrink and become "potty" under alkali rich conditions than bricks of the 42 per cent alumina type. It also shows the danger of having an initial high alkali content in the clay if vitrification is to be avoided. The nearer the composition of the brick comes to that of porcelain, the stronger is the product and the lower the resulting porosity. For certain purposes these properties may be more important than the thermal shock resistance but in general where the material gets too close in its properties to porcelain it suffers from spalling in service.

It is worth noting at this stage that other properties tending to give a porcelain like structure are fine grinding and de-airing. Since all these processes, together with the nature of the raw material, have a marked influence on the properties of the final brick, and since the latter must be adjusted to the particular purpose in hand, it is clear that the reactions which occur during the production of a fireclay brick are of vital interest to the steelworks operator.

The alumino-silicate refractories in the range 42 to 60 per cent alumina are relatively unimportant to the steel plant operator. In the United States such bricks are obtainable and are employed in boiler installations, for example; but in Great Britain there is normally a jump from the 42 per cent, so-called "high-alumina" brick to the 60 per cent alumina brick which is generally made from a sillimanite or kyanite base. In the United States, this latter class of bricks is more usually made from diaspore. Both types of products give excellent service but unfortunately their price is high and consequently their application limited.

The ordinary sillimanite brick is made by grinding calcined sillimanite or kyanite to a normal brick batch grading, for example, 7 to 25 mesh 45 per cent, 25 to 72 mesh 10 per cent, through 72 mesh 45 per cent. It is generally bonded with a ball clay, together with a small proportion of sulphite lye, to give green strength. Such bricks are relatively easy to

make, the drying and firing shrinkage being negligible and considerable fired strength being developed at temperatures from 2372 deg. F. upwards. No difficulty is obtained in getting bricks of low after-contraction and high refractoriness under load, indeed by suitable mixing of calcined and raw kyanite with clay, mixtures can be prepared which are volume stable both on firing and in use. These properties are a great help in obtaining good shape for which the sillimanite brick is well known.

Fused mullite bricks are make by melting diaspore or bauxite with clay in an arc furnace and casting in blocks. The manufacture of standard squares by this method is scarcely practicable but large shapes are made which have given excellent service in glass tank furnaces. At present, the application of such electro-cast refractories in steel works is extremely limited. Bricks of the mullite type can also be produced by adding alumina to sillimanite either alone or together with a mineralizer such as feldspar. Batches of this type have been used successfully for special types of nozzles, but again their application is at present limited.

Pure fused alumina ware of negligible porosity in now commonly used for laboratory work. It is prepared by milling alumina to an extremely fine state, slip casting and firing to about 3272 deg. F. Crucibles made in this way are virtually impervious, of zero porosity, and have as high a slag resistance as their chemical nature permits. Bricks are not at present made by this method; the usual procedure being to grind fused alumina (98 per cent purity) and mix it with a small amount of bond clay. Provided the bricks so made are fired at a really high temperature they attain great strength both in the cold and hot state and have properties in many ways similar to those of magnesite bricks. Their price is, however, at present excessive and more use has been made in steel works of bricks of the 70 per cent alumina type such as may be made by bonding diaspore or fused alumina with various clays.

Properties

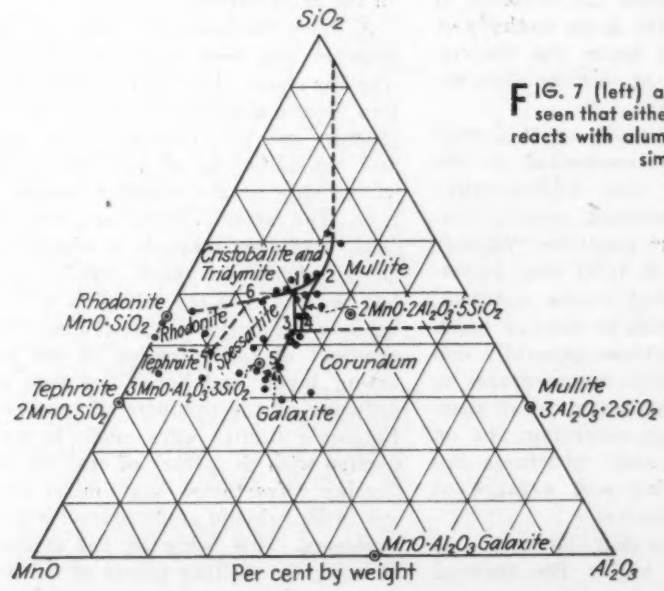
The properties of a wide range of alumino-silicate refractories, as given by F. A. Harver, are set out in Table II. The bricks referred to in this table are all of American manufacture, while properties obtained on similar British bricks are shown in Table III. It should be emphasized that properties such as those given are only absolute for the brick in question and that, particularly with firebricks, there is a serious brick to brick variation. This has been brought out very clearly in the A.S.T.M. Manual on Testing of Refractories and is further substantiated by our own recent tests on the porosity and cold crushing strength of blast furnace bricks. Variations from 2000 to 6000 lb. in cold crushing strength are by no means abnormal while bricks with porosities varying from 18 to 28 per cent are often found in the same consignment. In all probability these wide variations are mainly the result of temperature variations in commercial kilns.

Nevertheless, the properties given in Tables II and III suffice to illustrate the general trend when going from an intermediate heat duty brick to one of the 90 per cent alumina class. As would be expected there is a steady rise in pyrometric cone equivalent with the alumina content and a general rise in the refractoriness under load. The additional care and hard firing treatment given in the production of high heat duty and super duty fireclay bricks ensure both a low after-contraction and a good crushing strength, but it should be realized that these are only the results of special treatment and would not be obtained if the bricks were fired at the temperatures used for siliceous fireclay brick.

The bulk density again is largely a matter of manufacturing technique. The specific gravity of the product tends to increase with the alumina content and hence other things being equal the bulk density should also go up. It will be seen, however, from Table II that the porosity is by no means a constant, super duty bricks having porosities as low as 14 per cent compared with those as high as 35 per cent for the 70 per cent alumina brand. Neither of these figures should be considered as fundamental since the low porosity of the super duty brick has only been obtained by careful control in manufacture, while the 35 per cent for the 70 per cent alumina brick could doubtless be reduced by using a modified production technique.

In addition to the properties listed in Tables II and III, there are a number of other properties which are of particular interest with fireclay bricks.

Heindl has determined the thermal expansion of a large range of fireclay bricks up to very high temperatures, both after medium and high temperature pre-firing. His curves confirm the general assumption that the expansion of a fire-brick on heating to 1832 deg. F. is usually about 0.6 per cent and that it tends to be reduced somewhat by pre-firing. Above a cer-



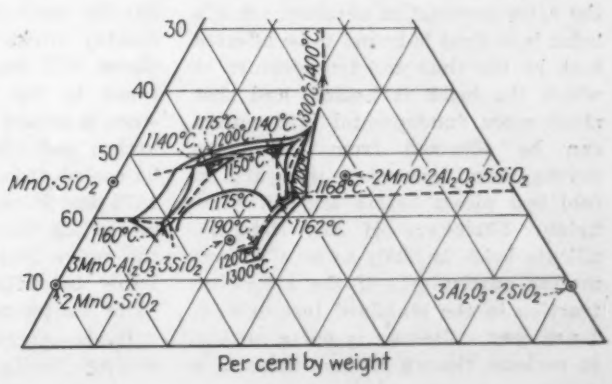


FIG. 7 (left) and Fig. 8—The MnO-Al_2O_3-SiO_2 system (after Snow). It will be seen that either corundum or mullite may crystallize from melts formed when MnO reacts with alumino-silicate refractories. The low melting point area occupies a similar position to that in the FeO-Al_2O_3-SiO_2 system.

tain temperature, usually about 2192 deg. F., shrinkage occurs and compensates for any thermal expansion which may still be taking place.

The shrinkage which is obtained on firing a brick for a given time and a given temperature depends on a large number of factors. This is brought out clearly by Fig. 12 which shows the curve obtained when a section cut from a fireclay bessemer tuyere was heated in an expansion apparatus. It will be seen that by the time the temperature reached 1472 deg. F. the brick although pre-fired had started to shrink; by 2192 deg. F. it had shrunk 1 per cent, but soon afterwards it started to expand rapidly. This latter expansion or "bloating," which is due to the sealing of the surface and the subsequent expansion of trapped gases, may be considerable with siliceous fireclay bricks. In this particular case it reached 4 per cent at about 2372 deg. F. after which the surface presumably became fluid enough to enable the trapped gases to escape and a rapid shrinkage set in. The study of such a curve shows that the after-contraction obtained when a brick is re-fired is bound to be affected both by the time and temperature at which the brick is heated, and that much more fundamental information can be obtained from continuous curves than from measurements on cold test pieces before and after re-firing. Shrinkage of any alumino-silicate brick is likely to be a serious matter particularly if the after-contraction in the standard test exceeds 1 per cent. Bloating is not generally so serious, though it does indicate a soft condition in the brick. For certain purposes, for example ladles, it is definitely an advantage since it tends to give tight joints and a porcelain like structure at the working face. (Also see "Casting Pit Refractories," THE IRON AGE, Nov. 20 and 27, 1941.)

Torsion Tests

A great deal of work has been done by A. L. Roberts and co-workers on the modulus of elasticity in torsion of fireclay bricks both cold and hot. Information of this type together with data regarding the extent to which fireclay bricks are strained after firing is very much needed if a fundamental attack is to be made on the problem of thermal shock resistance. Thus, in a recent paper, Saville and Roberts have shown the influence of the plastic and dry press methods on the rigidity and hence the thermal shock resistance of various alumino-silicate refractories.

For a detailed study of this work the reader is recommended to the original papers (see bibliography) but the main conclusion, namely, that fireclay bricks are generally "plastic" above 1472 deg. F. is of vital importance to the steel works operator, since it means that, on the one hand, arches and structures generally can be cooled from high temperatures to 1472 deg. F. without any risk of thermal shock damage occurring, and on the other hand such structures are liable to softening and collapse at quite low temperatures.

It also suggests that the method of testing fireclay bricks for thermal shock resistance in which they are suddenly heated to 1652 deg. F. and subsequently cooled to room temperatures is reasonable since above this temperature no further strain is likely to be set up. This does not mean, however, that the strain on heating quickly to a high temperature is no greater since the rate of heating-up is affected by the temperature differential.

The necessity of producing fireclay bricks which will stand up to rapid heating and cooling in boilers where they are in contact with coal ash and in addition maintained at a high temperature, has led to the introduction in the United States of the panel-spalling test. This test has the advantage over the normal shock test in that the bricks are pre-heated and that the service conditions are, therefore, to some extent simulated. Any shrinkage or vitrification of the surface which might occur in service is given a chance to take place and the effect of this on the thermal shock resistance of the panel, as a whole, tested.

The disadvantage of this type of test is the number of bricks required and the long time required to get a satisfactory result. Further work on the correlation of results of this test both with service and with the results on small test-pieces is badly needed.

The resistance of alumino-silicate refractories to slags high in iron or manganese oxide has already been discussed in connection with the corresponding systems. In practice the slag resistance of fireclay bricks can be tested by a number of methods, among which may be listed the determination of the melting points of brick-slag mixtures, the action of a "pill" of slag on a fireclay brick and the effects of a gas flame loaded with slag particles when allowed to impinge on the brick surface.

A more fundamental study of the problem has been made by Fehling who has shown that the two main factors determining the attack of the refractory are the viscosity of the slag and the solubility of the refractory in the slag at the working temperature. The latter is important, not because slag ever succeeds in dissolving enough brick to reach equilibrium, but because it is the solubility of the brick in the slag which determines the gradient of concentration in the reacting layer, and hence the rate of diffusion of the products of reaction. Fehling's studies were made in connection with the attack of coal ash on fireclay refractories, but similar considerations should apply to steel works problems. This being so, the method of using the melting points of refrac-

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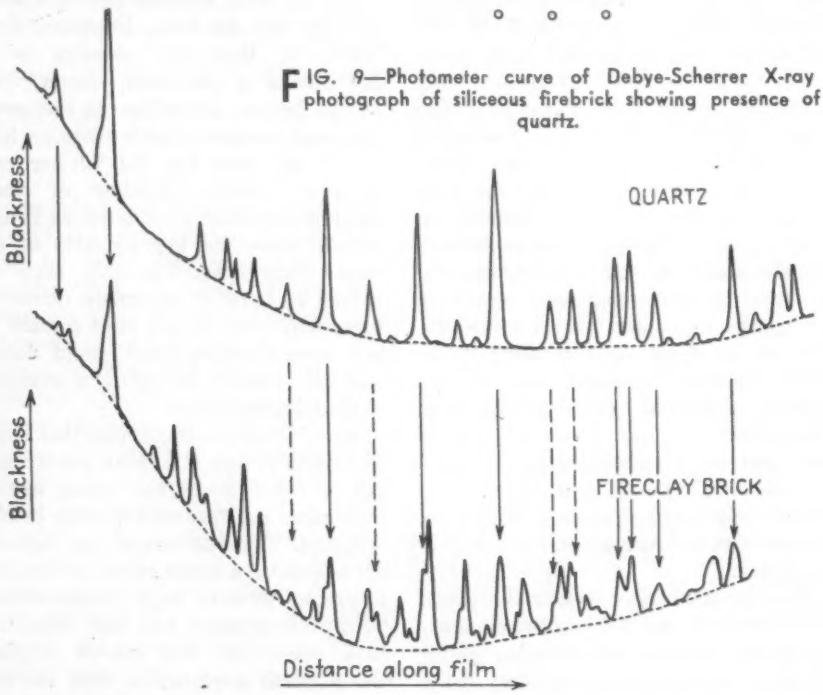
FIG. 9—Photometer curve of Debye-Scherrer X-ray photograph of siliceous firebrick showing presence of quartz.



tories-slag mixtures, to obtain the solubility of the refractory in the slag at a working temperature is a very useful one.

The principal difficulty in applying it to steel works materials is the fact that iron oxide is normally a main constituent in the corroding slag and that the state of oxidation is of *vital* importance. The precise state of oxidation in the furnace is often not known and even if it is known is extremely difficult to reproduce in the laboratory. Slag resistance tests must, therefore, at present be considered as only a preliminary attack on the problem, the final sorting out of the different grades being left to the works trial. In this connection it should be emphasized that information correlating the tests of properties of alumino-silicate and other refractories with their behavior in service, can be and should be collected in all steel works so that eventually the prediction of service behavior from laboratory tests may reach some degree of certainty. At present, the best that can be done is to compare the properties of new bricks with those of bricks whose behavior in service is known.

Application

The principal applications of alumino-silicate refractories in steel plants have already been detailed in the sections dealing with furnaces. They find many other uses, in blast furnaces and coke ovens, but these will not be discussed in the present series. Fireclay bricks are also used in cupolas, the quality generally being of the 30 to 38 per cent alumina type, but such bricks are usually covered with a layer of ganister (quartzite-clay) which is frequently renewed. Alumino-silicate refractories are also used in the form of cements and monolithic ramming material. Fireclay bricks are generally set with a cement having a fireclay base either alone or with an addition of calcined material. If the bricks are of good shape it suffices to dip them in a clay slip, but for other purposes butted joints are preferred. The disadvantage of using straight fireclay is its high shrinkage in drying and firing and its relatively low strength. For this reason special cements are marketed, for example, those made from calcined diaspore, clay and waterglass, which have much better properties. In addition to workability they have a considerable strength on drying which is maintained up to the working temperature. In spite of their cold setting properties they have a high refractoriness, often 3074 deg. F. or over. Their freedom from drying and firing shrinkage, which is due to the presence of a considerable proportion of pre-calcined material, enables them to be used in positions where raw fireclay would be quite unserviceable.

When a cement possesses particularly good workability, a long water retention time and freedom from cracking and in addition gives excellent results in the positions for which it was recommended, the temptation to use it elsewhere is considerable. It should therefore be stressed that there is no such thing as a "good" cement in any universal sense, and that the "chemistry" of the job should be taken into consideration before an alumino-

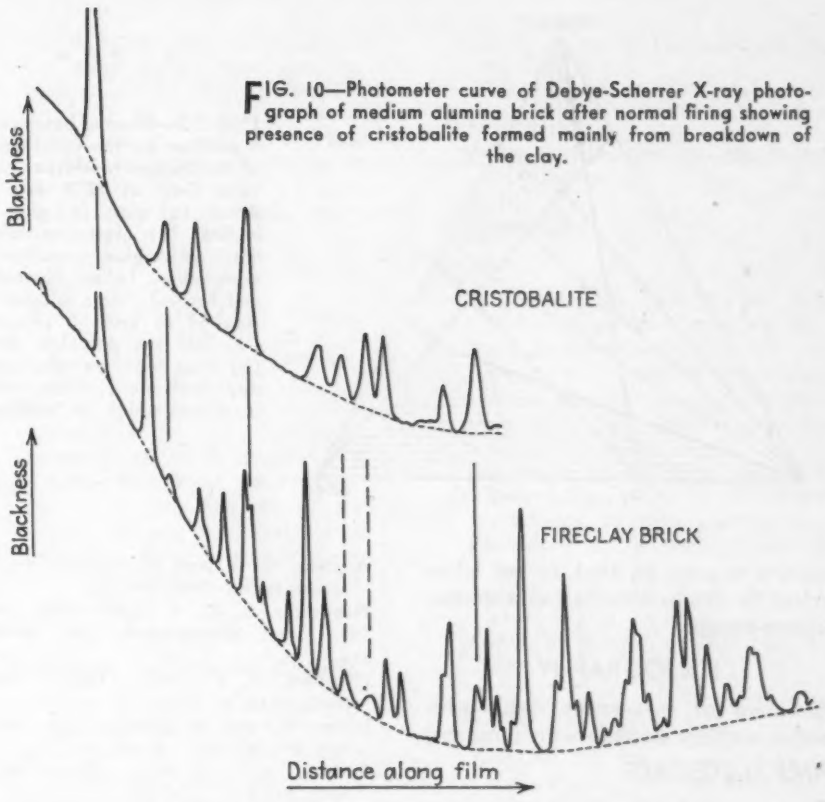


FIG. 10—Photometer curve of Debye-Scherrer X-ray photograph of medium alumina brick after normal firing showing presence of cristobalite formed mainly from breakdown of the clay.

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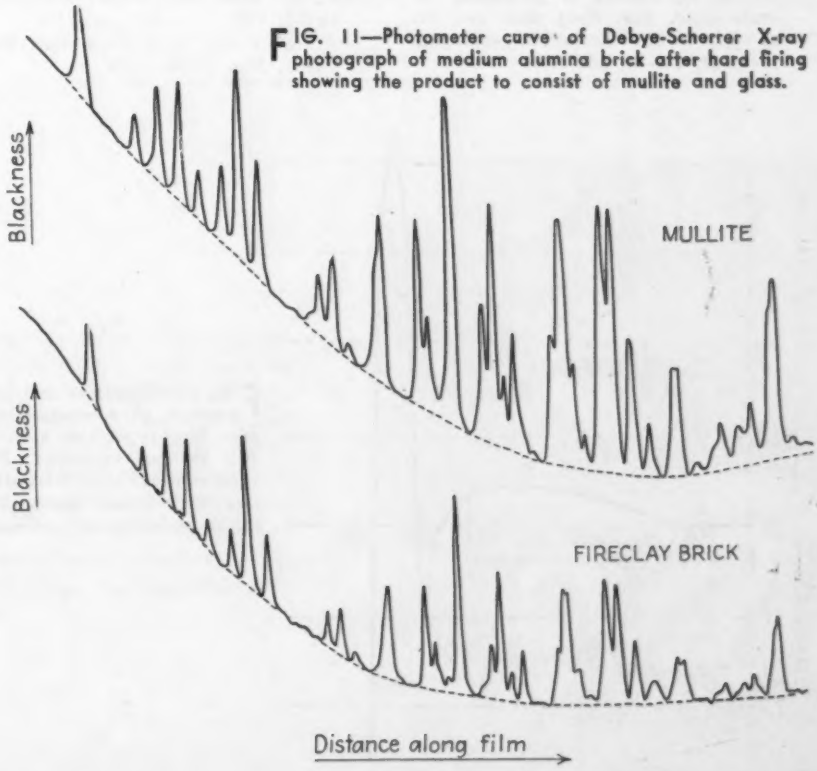

FIG. 11—Photometer curve of Debye-Scherrer X-ray photograph of medium alumina brick after hard firing showing the product to consist of mullite and glass.

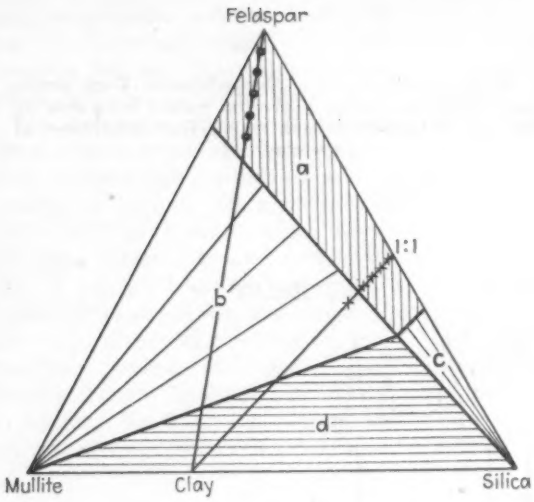

FIG. 12—Effect of batch composition on the constitution of mullite-quartz-feldspar mixtures fired at 2552 deg. F. Areas: (a) glass, (b) glass + mullite, (c) glass + cristobalite, (d) glass + mullite + cristobalite (after Navratiel and Fessler). More feldspar is required to bring a siliceous clay into the porcelain field (b) than with an aluminous clay, particularly if the latter is already high in alkalies.

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silicate cement is used to set silica bricks or bricks outside the aluminosilicate range.

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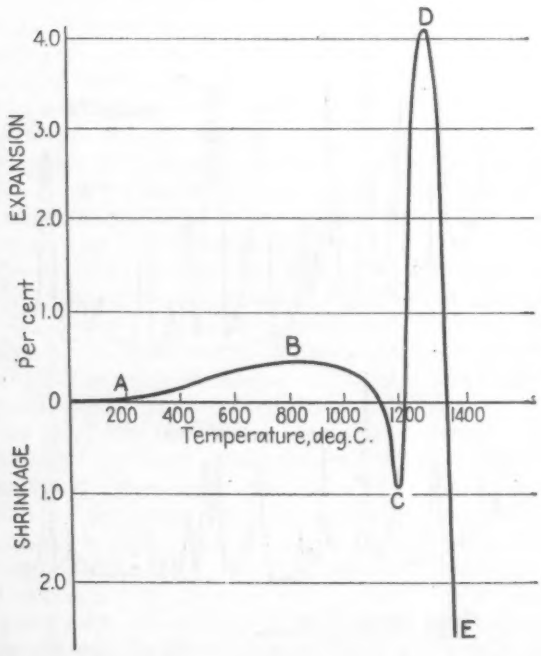

FIG. 13—Expansion and contraction of a medium alumina fireclay brick on heating. A-B thermal expansion, B-C after-contraction, C-D bloating due to trapped gases, D-E rapid shrinkage or collapse.

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CHAIN GUIDE REDUCES WEAR: In the operation of car type annealing furnace a considerable amount of sand is drawn from the furnace and into the channel iron guide in which the pulling chain rides. The abrasive action of the sand causes both chain and channel iron guide to wear fast. At the suggestion of F. R. Elliot, superintendent of the East Springfield, Mass., plant of Westinghouse, this channel iron guide has been replaced by a guide having numerous slots in the bottom. The sand dragged from the furnace door seal falls through these slots and in this manner the guide is kept free from abrasive material and both chain and guide life are considerably lengthened.

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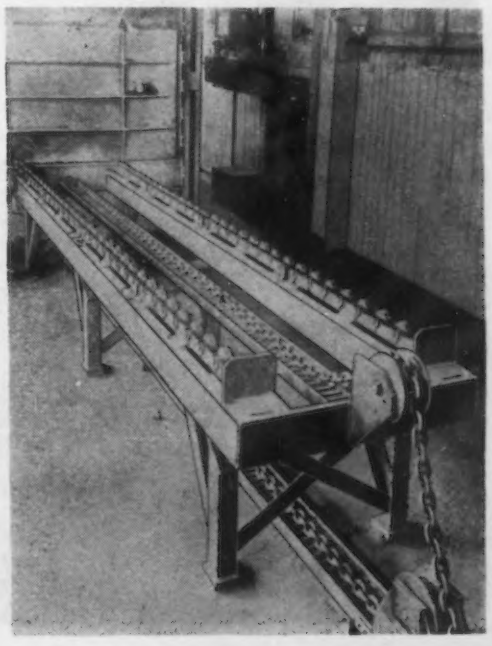

Particle Size Determination For Metal Powders

. . . The use of a photocell to determine particle size makes available a simple method of calculating sizes of fine powders. This new apparatus which can be employed for setting up standards and controlling production is herein described as are the factors influencing the bonding of metal powders.

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AMONG the reports presented before the recent annual meeting of the Electrochemical society were three on powder metallurgy. The paper on "Presses and Processes for Metal Powder Products," by E. V. Crane and A. G. Bureau of the E. W. Bliss Co., Brooklyn, reviewing existing powder metallurgical practices will be published in forthcoming issues of THE IRON AGE. The two other papers dealt largely with the question of particle size of metal powders.

Although size determination of all particles is an important step in powder metallurgy, of particular value is the determination of size distribution of particles that pass through a 325-mesh screen, Philip R. Kalischer research engineer, Westinghouse Electric & Mfg. Co., reported at this meeting.

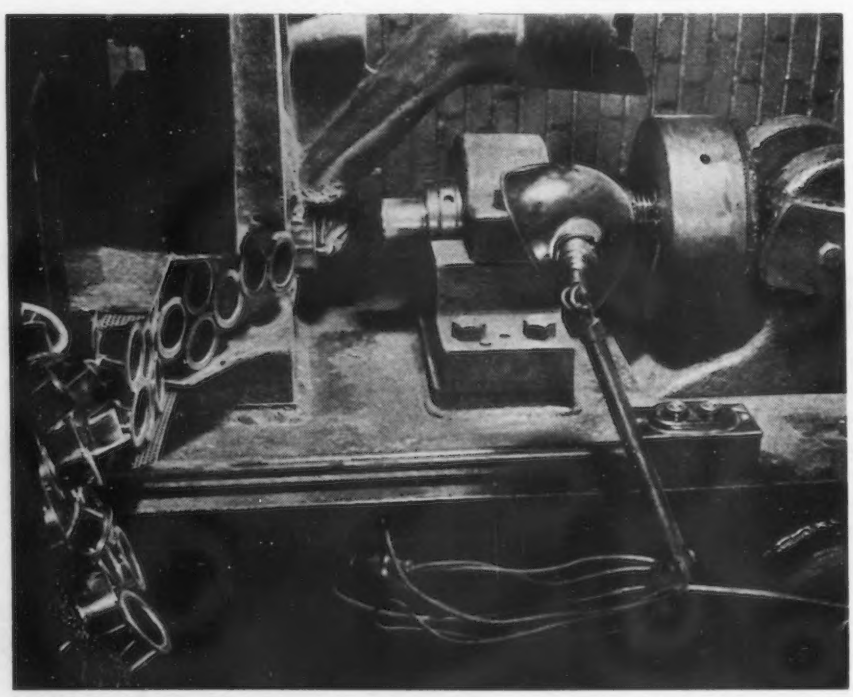
There are a number of different methods available for sizing fine powders. These are: Microscopic; air elutriation; liquid elutriation, and gravitational fractionation.

Microscopic particle size measurements are made by counting the number of particles having a predetermined size range in any single field of observation. The size ranges are usually in steps of either 5 or 10 microns. The count by its very nature is statistical, requires a trained technician and is time consuming. It is further, difficult to interpret the results of a microscopic count. For example, the dimension measured may be considered to be the average diameter of a sphere. Based upon this assumption, the specific volumes and specific areas can be calculated. For some powders this assumption is approximately correct, but for others, electrolytic powders, for instance, such an assumption is highly inaccurate since these powders tend toward flat-plate or needle-like structures.

Sizing by air elutriation, or more commonly, air separation, depends on floating the particles in an air stream of controlled velocity. For perfectly spherical particles, this method can be made quite accurate. By varying the air velocity from some minimum to some maximum, particles of different size ranges can be separated. The weight of each fraction can then be determined. However, since it is rare that powders are even nearly spherical, errors enter due to variation in specific area for particles of a given weight.

Sizing by liquid elutriation is subject to the same general objections as by air separation and is, in addition, a rather messy job and far slower than air elutriation.

THIS automatic machine is compressing copper powder into bearings. All operations are automatic, requiring only occasional recharging of metal powder into the hopper and carting away of compacts for sintering.

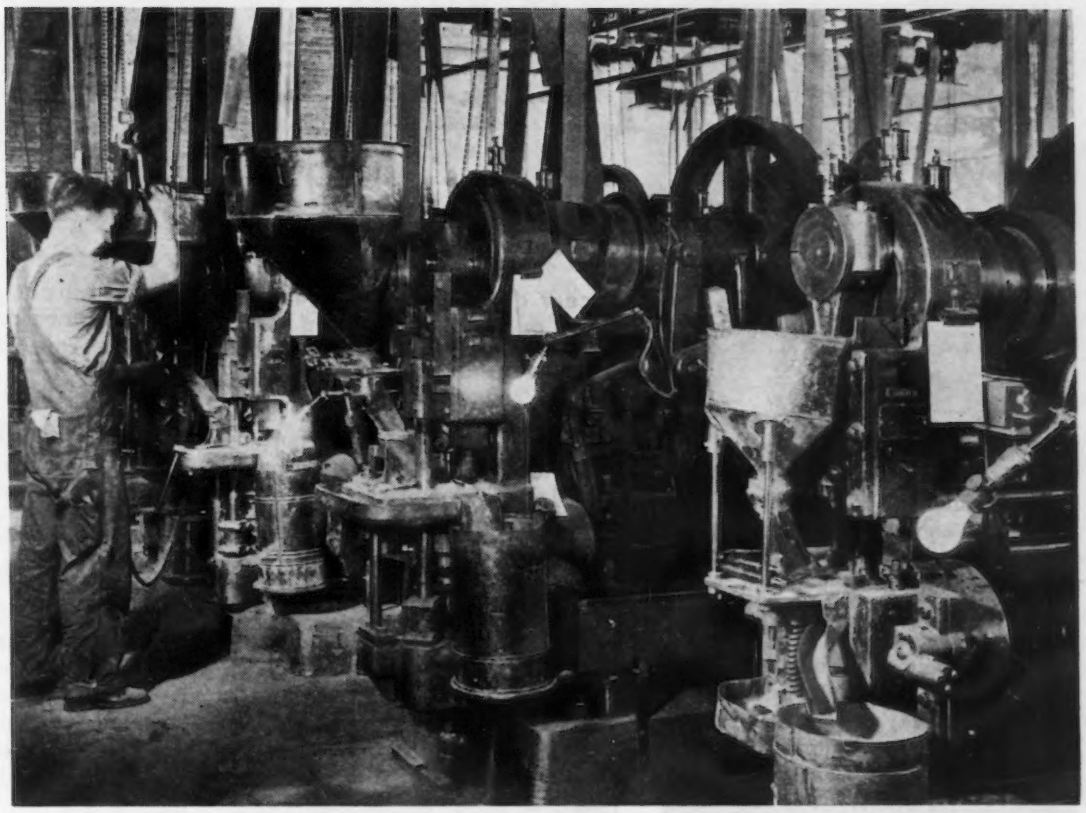


Sizing by Gravity

Gravitational fractionation methods can be divided into two broad classes.

In the one class are sedimentation tests where the time for a given volume of powder to fall a fixed distance is noted. The settled powder is then removed and weighed. This type of test gives a particle size which is an average for an actual range. The size calculated is then the size of the particles if they were spherical. This is also true of the number of particles calculated on the basis of an equivalent size. This class of fractionation is relatively accurate as to duplication of results but is quite slow.

The second general class of gravitational fractionation embraces methods where the metal particles, after falling some known distance, interfere with a light beam focused on a photosensitive device, causing variations in the output of the photosensitive cell. This method is suscep-



A BATTERY of small automatic pill machines turning out a variety of powdered iron compacts. The hopper feeds the powder to the machine, and the compacts slide down the chute into the container in the foreground.

tible to the same criticisms as the first method, but can be made to be much more rapid.

All gravitational fractionation methods depend upon Stoke's law for calculation of particle size where

$$V = \frac{2ga^2 (d_1 - d_2)}{9\eta}$$

in which V is the velocity of fall of a particle through the liquid in cm. per sec.

g is the acceleration due to gravity in cm. per sec.^{2}

a is the diameter in cm. of a spherical particle falling through the liquid.

d_1 is the density of the particles in grams per c. c.

d_2 is the density of the liquid in grams per c.c.

η is the viscosity of the liquid in poises.

To correct for particles that are not spherical, particles of known size must be allowed to fall through the settling tube and the actual time noted. From the difference in actual time as against the time demanded by Stoke's law, it is possible to secure a factor k, so that the corrected Stoke's law is

$$V = \frac{2ga^2 (d_1 - d_2) (k)}{9\eta}$$

With all phases of manufacturing held constant, the correction factor is accurate for all sizes of powders below 43 microns.

If a light source and photosensitive device is placed at some fixed place along the liquid column, the change in output of the photo-tube can be used for determining the time increment for each range of particles and as short a time increment as is desired can be used. This device consists of a long glass tube 1 cm. inside diameter, on top of which is placed a small mixing chamber, connected to the tube by a rubber connection and provided with a pinch-cock on the rubber connection and a stopper for the open end of the tube. A 6-volt, 23-candle power bulb is used as a source of light with a selenium photoelectric cell as the light sensitive pick-up. The distance of fall is 30 cm. for most powders, although it may be varied at will. Slits at the light source and at the photoelectric cell are provided so that there is just 1 c.c. of suspension for the light to pass through. The light source for the photo-cell is calibrated by measuring the output of the photo-cell, when a clear liquid only is interposed between the light and the cell. A resistance in the light circuit is used to vary the intensity of the light to provide correction when necessary. A small rectangular flask is interposed between the light source and the tube to provide cooling for the light beam.

The suspending medium will vary for different metals, and even for the same metal when there is a marked change in particle shape. For example, on finely divided tungsten and molybdenum, acetone has been found to be the most satisfactory. For iron and copper powders made by oxide reduction, a mixture of 50 per cent by volume soy bean oil and 50 per cent by volume acetone. Electrolytic iron, on the other hand, works best in a mixture of about 25 per cent soy bean oil and 75 per cent acetone. In many cases the metal powder is not thoroughly wet by the liquid. In those instances a wetting agent must be used. The xanthates are excellent in this respect, particularly isopropyl xanthate.

After the range of sizes present in the powder is determined, the actual number of particles of each size present can be calculated from the formula

$$\frac{I_o}{I_o - I} = \frac{}{nl\pi r^2}$$

$$n = \frac{I_o - I}{l\pi r^2 I_o}$$

where I_s is the incident light expressed as microamp. of the cell output through the clear solution,

I is the transmitted light expressed as microamp. of cell output when the powder is falling through the tube,

n is the number of particles per c.c.,

l is the length of the light path

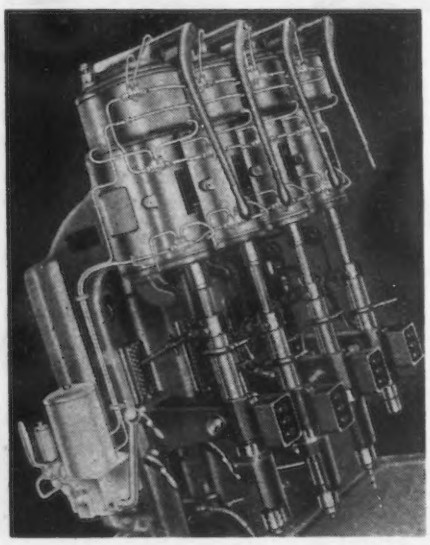
(CONCLUDED ON PAGE 166)

New Equipment . . .

Plant Service

Recent developments in lubrication systems, compressed air equipment, dust collectors and miscellaneous accessories for the metal working shop are described in the following pages.

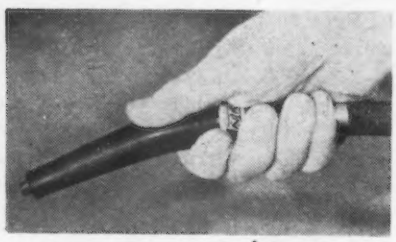
FOUR centralized lubricating systems designed for application to small, medium and large heavy duty machinery as well as to large batteries of machinery where it is desirable to lubricate many bearings from a central point, are announced by *Stewart-Warner Corp., Alemite Div.*, Chicago. In the Alemite LubroMeter system lubrication is accomplished through individual valves at each bearing connected to a single lubricant supply



line. The valves supply each bearing with an adjustable predetermined amount of lubricant. The Alemite dual progressive system (illustrated) provides for delivery of a predetermined amount of lubricant through a single pipe to each of a number of bearings, each bearing being fully lubricated before the next in line is serviced. The Alemite progressive system is a method of centralized grease lubrication, which will lubricate from three to 20 bearings, feeding each in turn with a predetermined amount of lubricant. The Alemite dual manifold system is a dual line of centralized lubrication, designed for high pressure grease or oil lubrication that can be applied to any number of bearings on one machine or a battery of machines. It is heavy duty in construction and particularly adapted to heavy equipment, batteries of machines and outdoor installation.

Lubricating System Kits

KITS containing injectors, pump, and necessary tubing, brackets, bolts and fittings for the lubrication of all heavy-duty bearings of punch presses, have been announced by the *Lincoln Engineering Co.*, St. Louis. The Centro-Matic lubricating systems have a single supply line, adjustable injectors and a hand operated pump. No special tools are required for installation.



Improved Blow Gun

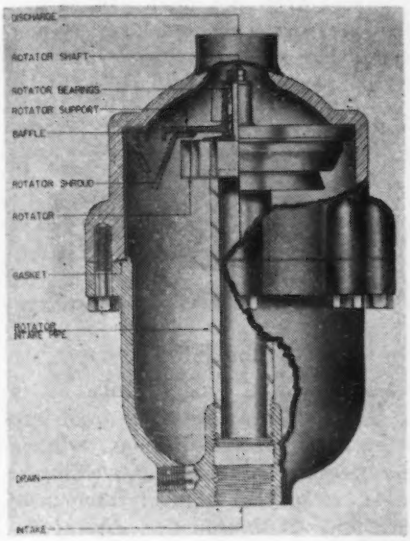
A BLOW gun, incorporating an internal trigger operating principle is being produced by the *Lonn Mfg. Co.*, Indianapolis. Delivery of compressed air is controlled by the flexing pressure of the hose on a throw pin which opens and closes a piston valve. The valve opens gradually responding to the degree of flexing pressure exercised by the operator. There are only three working parts to this type of gun, which can be taken apart quickly for cleaning purposes. It is made in several models covering pressure ranges from 75 to 500 lb.

Gasoline Demolition Tool

A COMPLETELY self-contained gasoline hammer paving breaker type of demolition tool is announced by the *Syntron Co.*, Homer City, Pa. This hammer weighs 96 lb. and is arranged for easy operation by one man. It uses chisels, drills or cutters having 1⅛ x 6 in. shanks. Using a star drill and water for flushing, this power hammer will drill rock to a depth of 30 in. In principle, it consists of a two-cycle gasoline engine in an inverted position, with two pistons, one an engine piston and the other utilized as the hammer.

Compressed Air Purifier

A UNIT which prevents moisture, scale and oil from being passed along through the compressed air system to the discharge point is announced by the *Bird-White Co.*, 3119 West Lake Street, Chicago. In the Pur-O-fier unit, a high speed rotor beats atomized moisture and vaporized



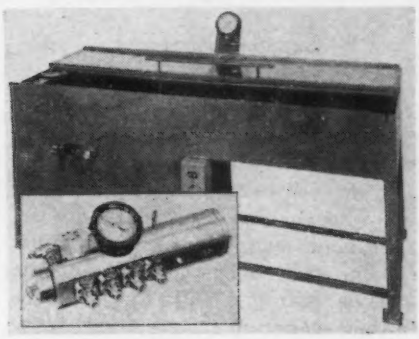
oil into larger particles which are drained off by gravity. Model A-2 can accommodate volumes from 10 to 35 cu. ft.; Model A-4 is for volumes from 35 to 100 cu. ft. For volumes above this range, multiple units are recommended.

Dust Suppressor

A UNIT designed to suppress dust and fumes from individual grinders or polishers has been developed by *Whiting Corp.*, Harvey, Ill. The Type GA Hydro-Clone employs compressed air to create a powerful suction on the hoods and to mix the dust laden air with water. The dust settles to the bottom of the unit as sludge which is easily removed through a clean-out opening. Where compressed air is not available, a centrifugal pump is furnished to recirculate the water which is maintained at a constant level by means of a float valve.

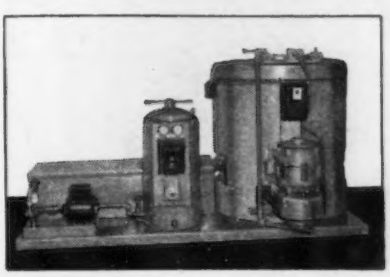
Hydraulic Test Bench

THE hydraulic test bench, Model T-113, which includes an intensifier that is capable of developing pressure up to 30,000 lb. per sq. in., in announced by *Hydraulic Machinery, Inc.*, 12825 Ford Road, Dearborn, Mich. The hydraulic circuit of this Hy-Mac model consists of a 2000 lb. per sq. in. constant delivery pump which is directly connected to a manifold incorporated in a high pressure intensifier that is hydraulically operated with a ratio of 15 to 1. Remote control through a hand adjustment is provided.



Oil Recovery Plants

COMPLETELY assembled cutting oil recovery plants for extraction of oil from metal chips, and the filtering and sterilizing of the recovered oil are announced by the *Hilliard*



Corp., 400 West 4th Street, Elmira, N. Y. The Hilco plants are equipped with electric heaters and filters together with valves so arranged that the oil can be recirculated for additional purifying to any degree desired. Installations of this equipment have resulted in saving as much as 85 per cent of oil heretofore discarded. The Hilco plants are especially adapted for the smaller shops.

Sump Tank Cleaner

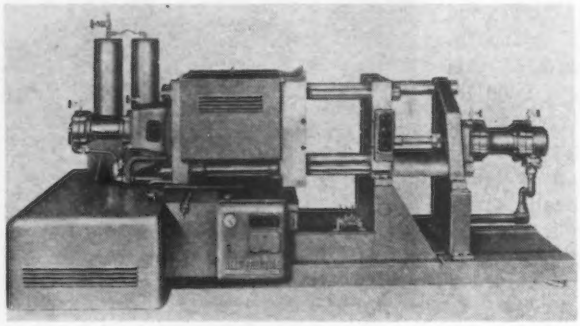
A VACUUM producer mounted on a closed tank for removing liquid and sludge from sump tanks is announced by the *Spencer Turbine Co.*, Hartford 6. The tank capacity of the Spencer Sump-Vac is 125 gal. or enough for three to five average sumps. The rate of pick-up of liquid is 40 gal. per min. A filter basket collects the chips and heavy sludge. A Neoprene ball float valve prevents overfilling the machine, which is emptied by gravity. After the liquid is removed, the rest of the material in the sump tank is removed by air vacuum. It is made in sizes from ¾ to 1½ hp.

Fire Extinguisher

DESIGNED especially to extinguish both flammable liquids and fires of electrical origin, the All-Out fire extinguisher manufactured by the *Powder Extinguisher Corp.*, 50 Rockefeller Plaza, New York, ejects a stream of dry chemical which, when

activated by heat, forms a dense, fire smothering clond. The insulating qualities of the cloud help guard against re-flash. The chemical, a non-conductor of electricity, is harmless to humans, and does not react with

parts of motors or machinery. When fully charged the extinguisher weighs 37 lb. and can be quickly recharged without special recharging equipment.

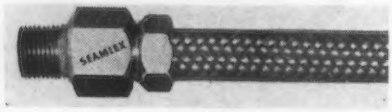


Die Casting Machines

THE design and construction of die casting machines developed by *Reed-Prentice Corp.*, Worcester 4, provides for quick change from the No. 1½G type, illustrated, for use with aluminum, magnesium and brass alloys to the No. 1½ type for zinc, tin or lead base alloys, or vice versa. Either cold chamber attachment or furnace attachment may be purchased separately. Change from one type to the other can be made in 4 to 5 hr. Features of construction include: One-piece welded base and hydraulic tank, improved linkage, heavy steel castings for die plates and improved hydraulic circuit and electrically operated hydraulic control, providing for both manual and semi-automatic operation. Arrangement is provided for automatic ejection of castings and easy application of core pulling cylinders for operation through electric push-button station.

Flexible Metal Hose Fitting

THE *Seamlex Co., Inc.*, 27-27 Jackson Avenue, Long Island City, N. Y., announces the addition of a ¾ in. i.d. fitting to its line of D.T. detachable type fittings. These fittings have only three parts, a metal-to-seat and are recommended for installations where temperatures above 250 deg. F. are met.

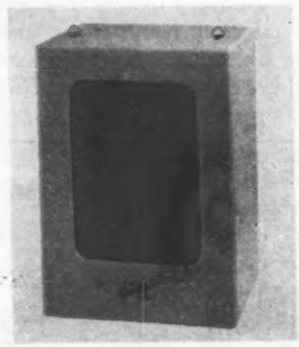


Protective Creams

TWO types of protective skin creams are announced by the *B. F. Goodrich Co.*, Akron, for dry and for wet working conditions. The "Clad" dry cream is of an improved type which has been made as nearly neutral to the skin as possible. Use of the dry cream protects exposed portions of the body against dirt, grease, grime and any other hard-to-wash-off substances. The Clad cream for wet use is made for protection of the skin where water and other dilute aqueous and mild chemical solutions are present. Both the wet and dry types leave the skin soft and smooth even after the cream is removed.

Sound Reproducer

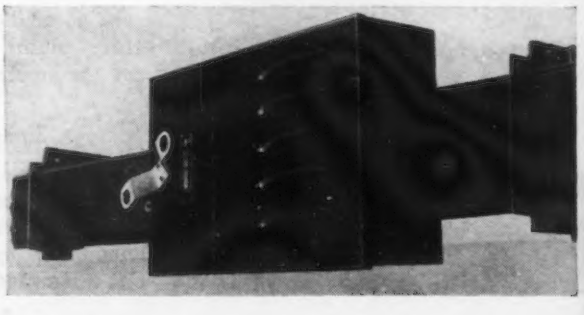
EXECUTONE, INC., 415 Lexington Avenue, New York 17, announces its model HI-8 duo-directional baffle reproducer which can be used in conjunction with its music and voice paging systems. An 8 in. permanent magnetic speaker having a 6-ohm voice coil is enclosed and the baffle is equipped with a convenient internal mounting for a special transformer which matches the impedence of the reproducer unit to wiring line and amplifier.

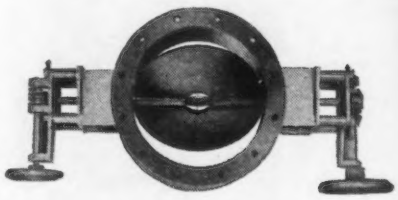


Three-Way Valve

THE quick action of the butterfly valve has been applied to the three-way valve, type No. 604, developed by *R-S Products Corp.*, Wayne Junction, Philadelphia 44. It is adapted to manual control as well as power operation and elevated temperatures. It is designed for quick interchange and mixing service and for pressures from 15 to 900 lb. per sq. in. The weight of the electric motor-operated unit is 8500 lb.

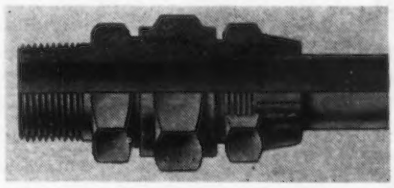
The two-in-one, butterfly valve type No. 608, illustrated, is a dual purpose valve designed for either a high pressure drop and small volume or a low pressure drop and large volume. Operating pressures range from 15 to 90 lb. per sq. in.





Tube Fitting

AN improved type of tube fitting which provides leak-proof and vibration-proof connections without the necessity of threading, welding or soldering of the tubing is announced by *Cotner-Wilkinson Co., div. of Logansport Machine Co., Inc.*, Logansport, Ind. The fittings are easily assembled or disassembled by tightening or loosening the compression nut. Double nut "Collet Grip" fittings are made in five standard shapes for tube sizes from ¼ to 1 in. (heavy duty fittings from ½ to 2 in.). Single nut fittings are made in five shapes for tube sizes from ¼ to 1 in.



Capacitor Plugs

THE flexible capacitor plugs put on the market by the *Bulldog Electric Products Co.*, 7610 Jos. Campau Avenue, Detroit, can be inserted into any convenient plug-in opening along a bus duct run. They can be mounted at the centers of the greatest load areas or moved about as the load areas change. The plugs are an integral unit consisting of 60 amp. 3 pole fusible switches or 15 to 50 amp. circuit breakers connected ahead of 3 pole single unit capacitors having discharge resistors. They are made for 230 or 460 volt 60 cycle service in capacitor ratings of 1 to 15 kva.

SPECIFICATIONS:
1" collet capacity, 9" swing, 16" center distance, sixteen spindle speeds from 27 to 1750 r.p.m.

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When tool room collet work with one inch diameter or less is done on heavy lathes designed to produce large work, here is what happens—time is lost, machines lose money by under-capacity production, excess power is consumed for the work involved and floor space is wasted.

For profits proportionate to machine investment, use the proper size tool room lathe comparable to the work involved.

To have complete information on a precision machine designed for speedy turning, boring and threading, obtain a copy of our bulletin illustrating and describing the above unit.

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Assembly Line . . . STANLEY H. BRAMS

•Invasion provides answer to question of why Army replacement parts orders are so high . . . Bloom rubbed off SAE meeting by invasion news, but attendance was good.

DETROIT—The start of the invasion last week provided a partial yet satisfactory answer to the problem which has been baffling industry of late—why Army orders reach such tremendous quantities on replacement parts for various requirements, particularly in the truck and the armored vehicle fields.

A highly-placed businessman, one who has had intimate contact with military planning, put it succinctly the other day. "To a businessman the Army is the most inefficiently run organization in the world," he said. "But when you live close to the services, you begin to understand why they look that way."

He explained in terms of the invasion. "The Army," he said, "has to figure that half its material may be sunk on the way. It has to figure that another sizable chunk will be lost on the beaches and in the fighting inland. To figure any other way would be suicidal. So if a landing according to plan is made, it looks as though they did a lot of overordering. And if the landing is better than plan, then the Army looks worse than ever. But it's necessary."

The invasion is the most dramatic possible example of this situation, but others have existed since the start of the war. And more factors than simple safety precautions are involved. The spare parts problem is compounded from variety, distance and the inherent problems of offensive action.

Take variety. Before the war began, the Army preparedness program required considerable numbers of trucks, to use a pat example. Perhaps the Army had its ideas about standardization then, but could no nothing about it. If it had said to GMC for instance that the 2½-ton truck of that producer would be the standard in that size, and that GMC would have to manufacture all the service requirements, the company could have done so only by eliminating all its commercial business, which neither any concern nor the Army wanted to do at that time. So the orders for 2½-ton trucks were spread among a number of different plants. Within the components of these various products was a great diversity, so spare parts ordering since then has had to be based on requirements for all these vehicles rather than one—a factor which probably multiplied ordering under other circumstances by two or three times. The alternative, of course, was nothing more or less than a completely controlled peacetime economy, a la Hitler. The fact is that this great variety of vehicles still exists even though standardization has been effected to a fair degree since the war began. So the problems still linger on.

A SECOND factor compelling overlarge buying of spare parts is the simple problem of logistics. It has been estimated that spare parts requirements have been multiplied at least five times, maybe multiples of that proportion, by the distances they must be hauled from the factories to the battlefronts. Then consider that in the European campaign alone, there are four major prime bases of supply, the British Isles, North Africa, the Persian Gulf and its roadway up into Russia, and the depots radiating out from Murmansk. All of these have to be supplied completely with full complements of all requirements, for it is manifestly impossible to supply one from the other as the need arises.

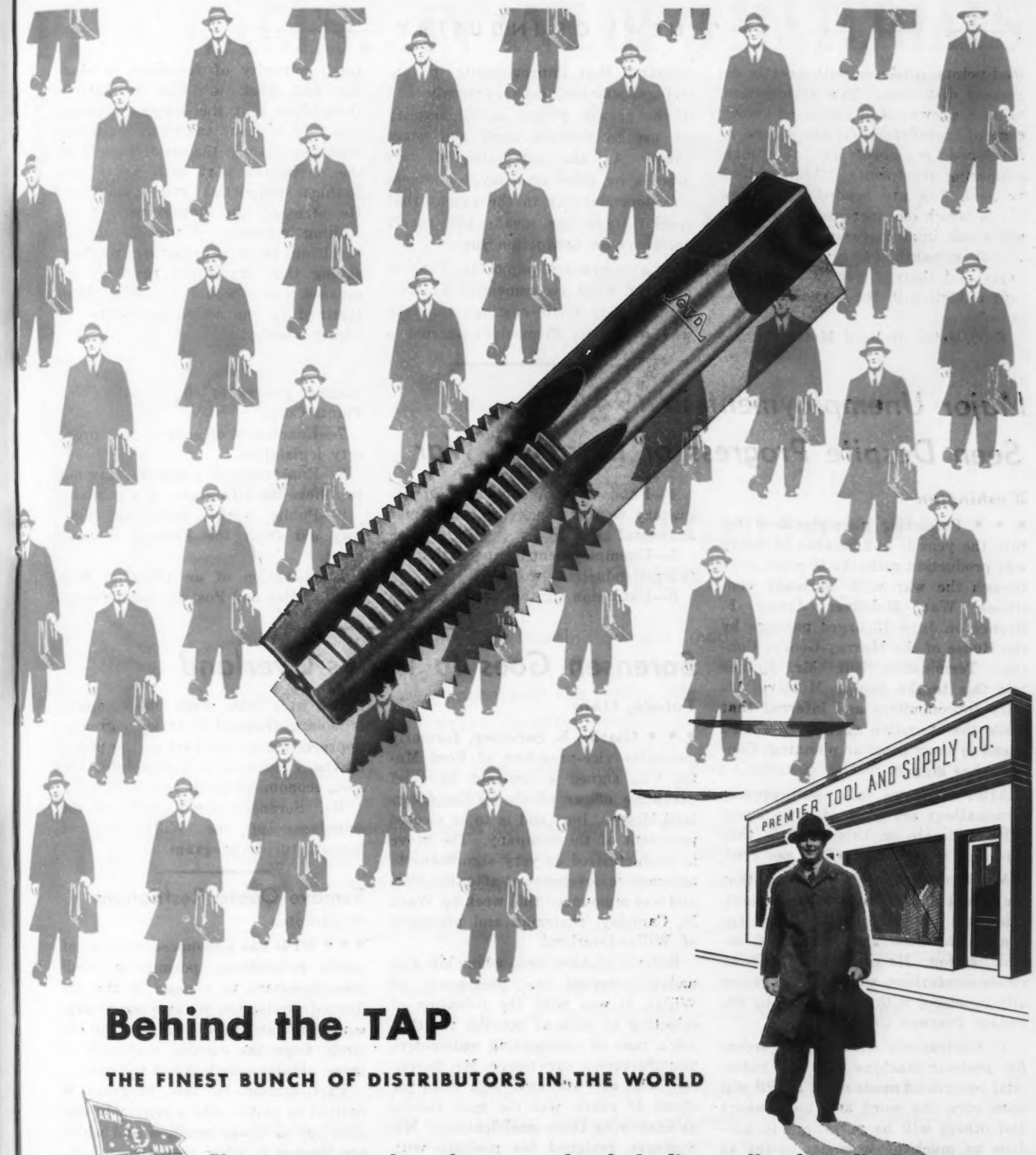
Furthermore, as offensive action begins, it is necessary to provide for an alternative number of campaigns. Should anyone fail, the others must be equipped to carry on, and for the maximum amount of time. This compels stockpiling of spare parts at a number of points in one theatre of operations as insurance for military success. When a campaign is finally completed, the stores at alternative campaign bases may become useless. The pat example in this respect is the Aleutians campaign, where supplies were stockpiled at a number of different points. The Japanese withdrawal made the success of the drive much simpler than expected. The intense difficulties of moving in supplies to these various far north bases are equaled by problems of removal, and it is likely, now that the drive is completed, that these spare parts supplies will lie at those northern bases for a long time to come.

Contrasted, Hitler's position is much easier. He operated from the first on a controlled economy which standardized all his military weapons, immeasurably reducing the variety of parts required. He is today operating on internal lines and can direct his shipments from his factories to whatever battle areas are most in need of them. It is little wonder that his spare parts requirements are so much lighter than ours.

We have other problems beyond the cold military facts. Take, for instance, a current compelling need for distributor rotors for jeeps. These vehicles are built without locks, so their drivers guarantee that their vehicles stay where they are put by the simple expedient of removing the rotor when they go away from the jeeps. As is the classic habit of American troops at war, non-owners of equipment left unattended may cast a predatory eye on it. A jeep is no exception, but it cannot be driven without the rotor. The result: Out of patriotic desire to be sure to be able to remove American equipment from a danger zone in case of an emergency, as many G.I. Joes as can get their hands on them are carrying jeep rotors around in their pockets. The drain on rotor stocks has been something tremendous to behold; that one spare part requirement has gone beyond all reason. But there is little that anyone can do about it except produce far, far beyond normal replacement requirements.

THE invasion rubbed the bloom off the summer meeting of the Society of Automotive Engineers last week in Detroit, although there was fairly good attendance and interest. Emphasis continued to be on postwar.

H. W. McQuaid of Republic Steel Corp. predicted in a paper on wartime steel developments that heat treating and processing progress would result in output of parts of improved useful strength at maximum



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load points, produced with greatly decreased distortion. This anticipation, he said, grows out of increased knowledge of transformation phenomena as developed in isothermal and martempering treatments. "Apparently," he said, "we are headed for a new era in which our increased knowledge will result in an increase of the actual useful strength of highly stressed parts and thereby permit an important reduction in the factor of ignorance."

E. C. Jeter of Ford Motor Co. anticipated that improvements in centrifugal casting, both currently and in the prewar period, would amplify its use to produce more and more parts. As the attributes of this process he cited economy, soundness and dependability to the extent that special inspection means are rarely necessary on production runs.

In a companion paper, G. Vennerholm of Ford recommended to companies using static castings that the way to protect themselves against a small minority of foundries producing bad work is "first to satisfy themselves that the design is sound, and then to issue specifications which definitely clarify the requirements of the particular part both as to mechanical properties and soundness." He stressed the importance of installing methods of process control resulting in a satisfactory product, saying that any slight resulting increased costs would be more than justified by the added assurances of higher quality.

Major Unemployment in 1944 Seen Despite Progress of European War

Washington

• • • **Predicting unemployment** before the year is out because of heavy war production cutbacks to come, even though the war with Germany continues, War Mobilizer James F. Byrnes on June 12 urged passage by the House of the Murray-George Contract Termination Bill. Mr. Byrnes told this to the Senate Military Affairs subcommittee and inferred that while the executive agencies are well ahead in their postwar planning, Congress has lagged.

After Germany falls, still greater terminations are planned. The latest WPB estimate on this score is that contracts will be slashed 50 per cent.

Mr. Byrnes, though insisting that the defeat of Germany is far distant, said that Congress must enact legislation to ease the impact of demobilization. He made the following recommendations which were generally in accord with those made by the Senate Postwar Committee:

1—Contractors should place orders for postwar machine tool and industrial equipment needs now. (WPB will soon give the word and tool-makers and others will be permitted to produce as much postwar equipment as there is capacity freed from military demand.)

2—That the General Accounting Office function with respect to termination be confined to examination of settlements to prevent fraud. (An audit would necessitate a huge postwar outlay of money for public works and relief.)

3—That the states be induced to liberalize their unemployment compensation laws by providing federal funds if necessary during the reconversion period.

4—Funds for transportation of migratory workers back to their homes at federal expense.

5—Unemployment compensation for federal industrial workers.

6—Extension of the authority and lending powers of the Smaller War Plants Corp.

7—Enactment of surplus war property legislation.

8—Enactment of a postwar tax bill to relieve the stringency of war taxes.

9—Public works, including highway aid from the Federal Government.

10—Creation of an Office of War Mobilization and Postwar Adjustment.

Sorensen Goes to Willys-Overland

Toledo, Ohio

• • • **Charles E. Sorensen,** formerly executive vice-president of Ford Motor Co., signed a contract as chief executive officer of the Willys-Overland Motors, Inc., and is to be elected president of the company. The move is characterized as very significant to automotive development after the war, and was announced this week by Ward M. Canaday, chairman and president of Willys-Overland.

Several months ago, when Mr. Canaday accepted the presidency of Willys, it was with the intention of selecting as soon as possible for that job a man of outstanding automotive manufacturing experience. Mr. Sorensen, who was affiliated with Ford for about 40 years, was the man chosen as answering these qualifications. Mr. Sorensen resigned his position with Ford early in March, 1944, because of ill health.

In a statement accompanying the announcement, Mr. Canaday said: "It is with great personal gratification that circumstances have made it possible to associate with the Willys-Overland the broad experience of my friend Charles Sorensen, who is regarded by many as the outstanding authority in America on mass production of low cost motor vehicles. We will benefit from his wide knowledge of production, marketing and organization at a time when our company is looking forward to an even greater appreciation on the part of the public of the virtues of a lightweight, low cost, economical-to-operate vehicle."

Mr. Sorensen commented on the soundness of the Willys-Overland manufacturing program.

Remove Quota Restrictions

Washington

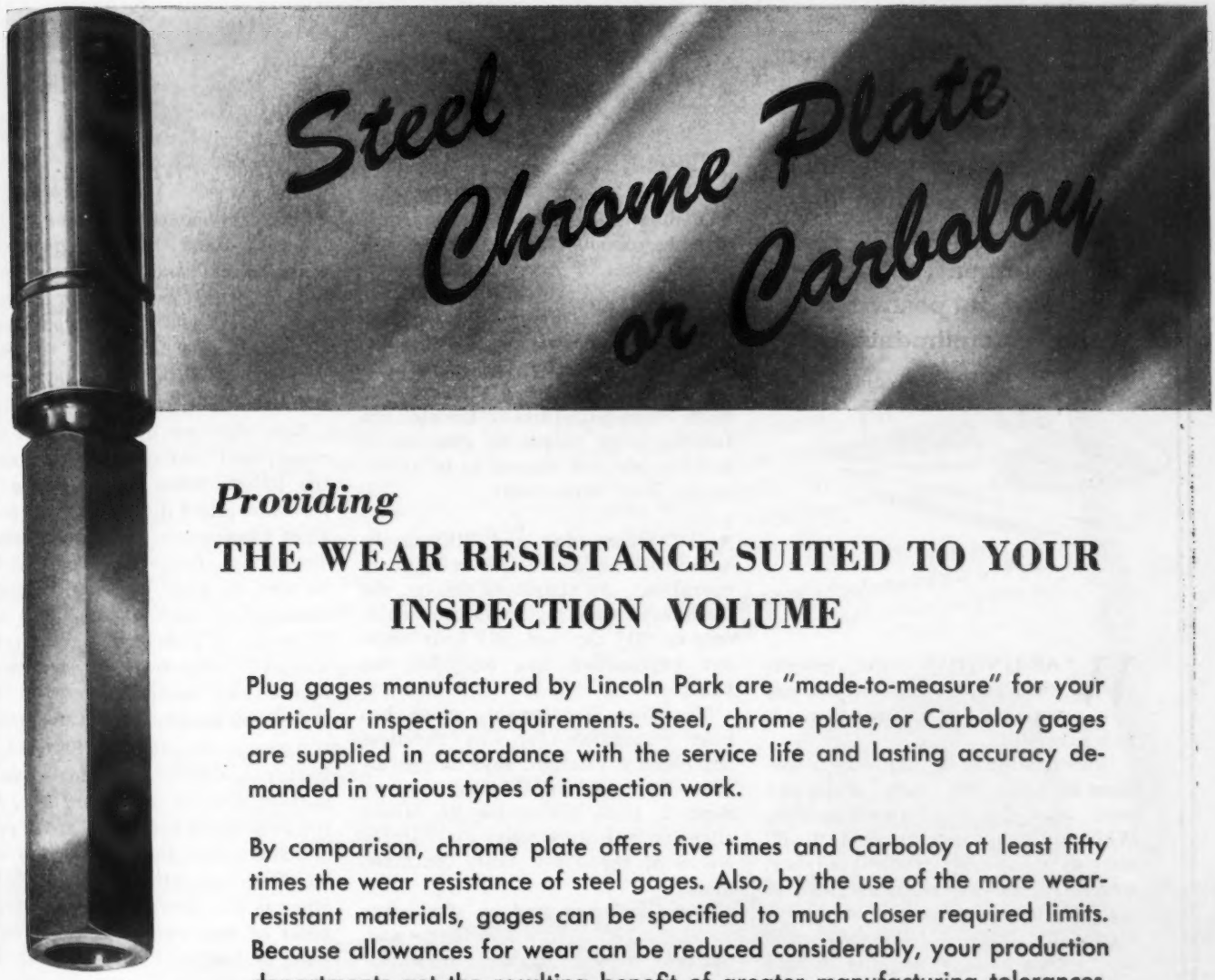
• • • **WPB has announced** removal of quota restrictions, permitting small manufacturers to engage in the unlimited production of farm machinery, equipment and repair parts made entirely from the surplus materials or those obtained with AA-4 ratings.

Participation in this program is limited to plants which regularly employ 100 or fewer workers and which are located in other than Group 1 labor areas, or on the West Coast, where it is limited to plants employing not more than 50 workers.

Correction

• • • **In THE IRON AGE** June 8, page 105, it was stated that non-railroad car building shops consume about 10 per cent of steel output. This should have referred to the total railroad industry, which accounts for approximately that percentage of total steel production.

PLUG GAGES...IN ANY OF 3 MATERIALS



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Plug gages manufactured by Lincoln Park are "made-to-measure" for your particular inspection requirements. Steel, chrome plate, or Carboloy gages are supplied in accordance with the service life and lasting accuracy demanded in various types of inspection work.

By comparison, chrome plate offers five times and Carboloy at least fifty times the wear resistance of steel gages. Also, by the use of the more wear-resistant materials, gages can be specified to much closer required limits. Because allowances for wear can be reduced considerably, your production departments get the resulting benefit of greater manufacturing tolerances.

In the production of Lincoln Park gages, careful control in grinding and lapping produces gages with extremely high finish—a guarantee of maximum inspection life. Class XX and X gages are finished with Profilometer readings no greater than 1.5 microinches. Readings no greater than 2.5 microinches are guaranteed on Class Y gages.

Prompt delivery of any type of plug gage you require can be promised by Lincoln Park. See your Lincoln Park sales representative or write directly to the plant.

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Washington . . . L. W. MOFFETT

• Government employees take holiday on invasion day . . . Washington officials see little lift to production because of invasion . . . Government seen less frank about postwar foreign commitments.

WASHINGTON — For government employees, invasion day was not just another day. It was a holiday.

Office radios competed with newsroom teletypes, the "coke" stand and local bars for employee attention. While agency big-wigs held "bull" sessions (called conferences) all day, secretaries and clerks congregated in the halls or formed discussion groups around the desks of fellow-employees and second-guessed on the second front.

Up on Capitol Hill, from the floor of the House and the Senate, members of Congress tried to coin undying phrases of reassurance or reaction to the start of the world's greatest battle. Only Congresswoman Clare Boothe Luce seemed to succeed when in commenting on the feelings of anxious mothers she said: "Time lags, creeps, crawls, but never seems to stand still."

Larger figures in the government muddle went about in frustration all day feeling that Washington should suddenly burst into a frenzy of activity as the American "sitzkrieg" ended. There was nothing to do, and many compared the last three years in this country with the early days of 1940 in England when the British had their "sitzkrieg" or waiting war before the bombing of the isles and the fall of Dunkirk.

THE early hours of invasion morning in Washington found transportation clogged — as usual. The most visible sign of D-day jitters was the anxious worried expressions on the faces of Army and Navy officers at the curb seeking taxis to speed them to their desks in the War and Navy Departments.

At the Pentagon, not much difference was noticed in the tempo of work. The butterflies in the stomach felt by most people in government and the edginess seemed to be absent in the War Department.

* * * *

• **"D" means day and "H"** means hour, both unknown, for a military operation. As simple as this is, the constant allusion by radio commentators to "D" day and "H" hour without explanation has mystified the public.

The War Department, which has been responsible for this harmless but obscure location, says the terms were first used in the last war on Sept. 7, 1918, before the St. Mihiel offensive in France when Field Order No. 8 of the First Army contained them.

The terms are used by strategists to set up the logistics of a battle, and, the War Department says, are a convenient way to do so. However, nothing explains what the Army did before it could calculate "D-1" and "D-2."

* * *

• **War agency officials** do not think that the invasion will speed-up war production or steelmaking much. Schedules are set and the steel mills are producing as much as they can already. One official hoped that the fact that an invasion is in progress will prevent strikes.

Only changes in models or the sudden demand for different types of weapons will cause shifts in military programs to keep pace with battle demand. The General Staff has made every effort to have in readiness the number and the kinds of weapons needed, and has tried to anticipate design improvement in every way possible.

A sudden success of the Allied Armies would probably uncork many postwar plans, and the turn-around to civilian production could come quicker than expected.

• **The government is being** a l
less than frank about foreign post
commitments and the reason gi
for not letting the public in on wh
going on is that it might not go o
the public knew about it. One S
Department official says that nego
tions would be ppht!

Now this odd attitude is not o
nonsensical and calculated to al
the public, while strengthening
hands of allied diplomats, it is do
right dangerous to Administrati
aims. For Congress, generally, h
no idea of what is going on, and
prepared to buck like a Texas st
if the State Department commits
United States to play the role
Santa Claus to Europe without C
gressional knowledge and approval.

Assistant Secretary of State Adol
Berle's alleged promise to Britain
part of our air transport fleet, a
the promise of a division of the gr
merchant fleet the country has b
building, are prime examples. A
other is the interagency plan for
posal of war surpluses to the co
tries of liberated Europe. Anot
is the carrying out of the Atla
charter in a way no one imagi
would come about—the sharing
United States raw materials af
the war with the rest of the wo
and vice-versa, through creation
governmental cartels.

Now, Mr. Berle has said he h
not promised Britain some of our a
planes but British statesmen say
did. The postwar shipbuilding of
Maritime Commission which in
opinion of shipping experts exceed
war needs long ago, is said to ha
White House approval. Congress h
not expressed itself on these matte
and by and large does not know t
details.

No agency concerned in the plan f
disposal of surpluses abroad will ma
the plan public, and silence is t
rule on the raw material deals. Whe
the cat is eventually let out of the ba
Congress and the public may put
right back and this will not
tribute very much to good feeli
in the United States.

12 Plus Pieces IN EVERY TOOL GRIND

SUNOCO
EMULSIFYING CUTTING OIL

Saves Time . . . Ups Production . . . By Boosting Tool Life 33%

More production . . . less interruption — that's the goal of practically every machine shop in the country today. And here's how one large shop achieved it by getting 12 plus pieces per tool grind.

Tool life was short in relation to their production quota of vitally needed parts for mechanized fighting equipment. "Down-time" for regrinding and resetting tools meant lost production time. So they asked a Sun Oil Engineer what he could do about it. After a careful study he recommended a change in cutting oil . . . to Sunoco Emulsifying Cutting Oil . . . and suggested they run a test to prove Sunoco's merit.

Test showed 33% greater tool life with Sunoco. They were able to machine an average of 47 pieces per grind as against only 35 with the previous oil. Less interruptions for regrinding . . . more production. So Sunoco was adopted for all operations requiring a soluble cutting oil.

Your plant can profit, too, from the advantages of Sunoco Emulsifying Cutting Oil. The exceptional heat-absorbing and rust-preventing characteristics of Sunoco are responsible for its almost universal use where closest tolerances, finest finishes, speed of production and economy are required. Let Sunoco help you pack every man-hour and machine-hour with peak production. Write . . .

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HELPING INDUSTRY HELP AMERICA

Says Grant of Union Demands Would Ruin Southern Steel Operators

Washington

• • • **Elimination** of geographical wage differentials as demanded by USWA would not only add $53,924,950 annually to the cost of steel production but because of natural handicaps faced by Southern steel operators, the granting of the union demand would be ruinous, Dr. John Van Sickle, Vanderbilt University, economics professor, told the WLB Steel Panel.

Workers would not profit because operators who have been accustomed to employ large numbers of low-productive workers would be forced to reduce their payrolls to keep production costs below prices. Fewer less-efficient workers hired at greater pay would scarcely permit the Southern operators to survive.

Dr. Van Sickle listed the handicaps of Southern steel operators as follows: 1—Low grade iron ore and coal; 2—small consumers whose orders are for small amounts requiring the changing of rolls often and greatly increasing the cost of production; 3—wide geographical dispersion of consumers with consequent higher transportation costs than other sections.

Inland Steel Co. counsel, Ernest S. Ballard, reminded the panel that WLB has no authority to order payment of dismissal wages and said that this worker demand is a national post-war problem. Mr. Ballard denied that dismissal wages are an established custom in American industry and endorsed increased unemployment compensation as recommended by the President in his annual budget message.

Commenting on workers' reluctance to face realistically the end of war production, Mr. Ballard said:

"The union's demand is based upon a fallacious proposition—namely, that workers holding wartime jobs in wartime plants have some kind of a vested right to those jobs which entitles them to indemnity if and when those jobs disappear because the plants in which they work are not required for peacetime production."

Citing decisions in which the Board had recognized its wartime powers and the Executive Order limiting it to order only such terms and conditions "customarily included in collective-bargaining agreements," Mr. Ballard quoted part of the decision in the Remington Rand case denying some union demands in which the Board stated:

"Any attempt upon the part of labor to take economic advantage of the war or to indulge in labor profiteering will redound to its discredit and boomerang against its best future interests."

Presentation of the general case ended on June 8 and hearings were recessed until late this month when individual companies will introduce testimony, largely concerned with counter demands.

Final arguments in the general case were made by John A. Stephens, chairman of the Steel Research Committee, and Chester A. McLain, counsel for the Bethlehem Steel Co.

"Ostensibly the objective of these demands is the establishment throughout the steel industry of uniform rates of pay for the same or similar kind of work," asserted Mr. McLain. "Actually, as an analysis of those demands will show, their purpose is to provide an open end provision or escape clause in the wage contract through which the union can obtain during the term of the contract a steady stream of substantial further wage increases for a large number of employees in the industry."

Mr. Stephens pointed out that wage rate structures at the various plants in the industry have developed over long periods of years under the influence of many factors including local conditions, location with respect to raw material supplies and markets for their products, transportation facilities and the like.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

LOOK AT 'ER.' SHE WASTED TWO MINUTES LOOKIN' IN TH' MIRROR TO SEE IF HER FACE WAS DIRTY, AN' THREE MORE WIPIN' IT OFF WITH HER HANDKERCHIEF!
A MAN WOULD WAIT TILL LUNCH TIME OR QUITTIN' TIME TO CLEAN UP! I MAY BE OLD FASHIONED, BUT YOU CAN'T TELL ME WOMEN IN A SHOP ARE EFFICIENT!
IT'S WASTIN' TIME FOR HER TO KEEP HER FACE CLEAN, BUT IT'S ALL RIGHT FOR THEM TO WATCH HER
AND FER US TO WATCH THEM!
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Amendment to M-11-b Will Permit Greater Use of Zinc

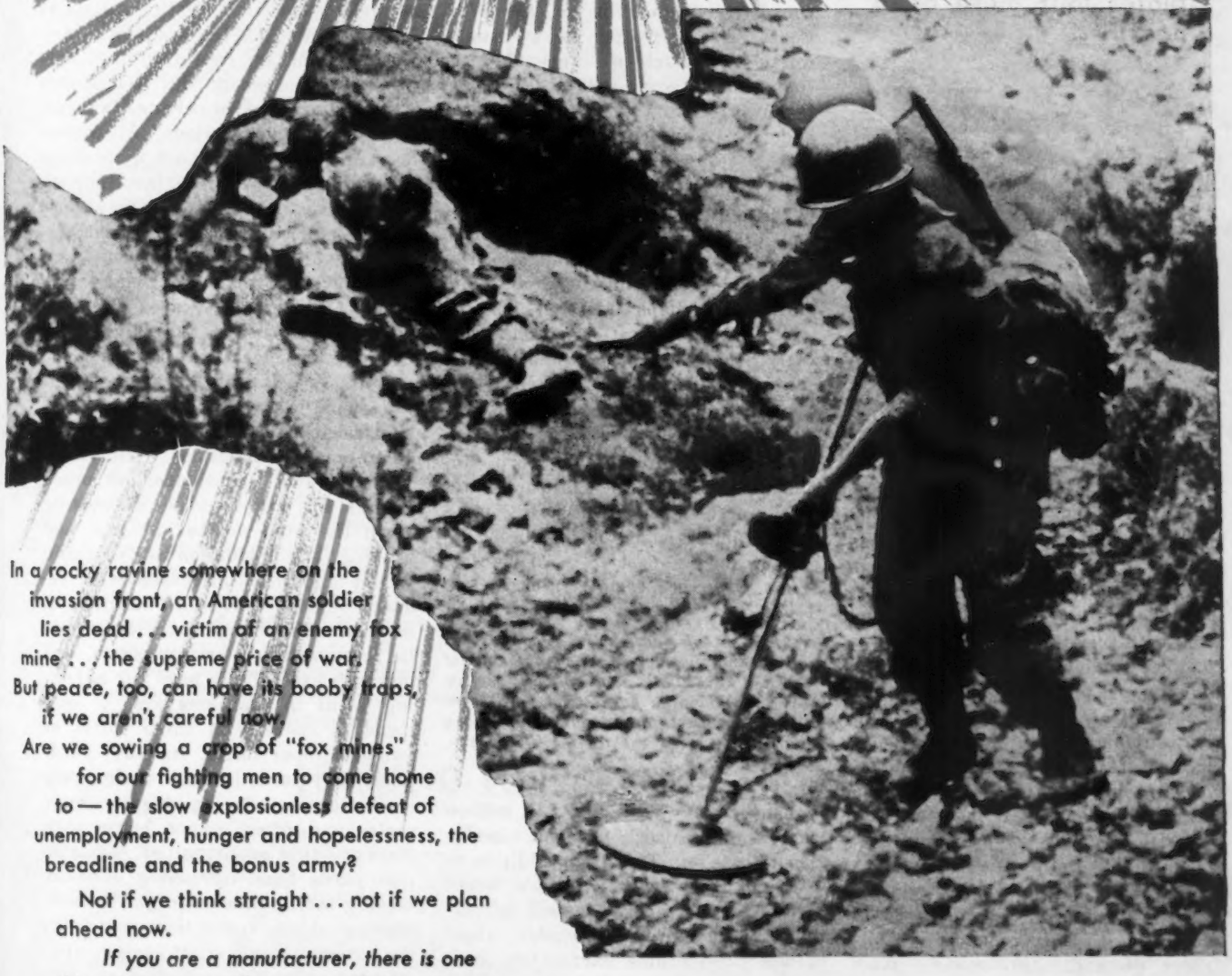
Washington

• • • **With two exceptions** a WPB amendment to M-11-b provides for no additional consumption of zinc but merely incorporate the permission to use the metal in the manufacture of certain articles which has recently been granted on appeal.

Included in the group that no longer need make individual appeals are those using zinc for research, development and experimental activities. Restored uses of zinc, expected to result in an additional annual consumption of not more than 500 tons, are in the manufacture of laundry tags and protective edging and corner beading for construction work. WPB said that in both cases superior products and savings in man-hours and substitute materials will result.

Are we sowing a crop of peacetime

FOX MINES IN AMERICA?



In a rocky ravine somewhere on the invasion front, an American soldier lies dead . . . victim of an enemy fox mine . . . the supreme price of war. But peace, too, can have its booby traps, if we aren't careful now.

Are we sowing a crop of "fox mines" for our fighting men to come home to — the slow explosionless defeat of unemployment, hunger and hopelessness, the breadline and the bonus army?

Not if we think straight . . . not if we plan ahead now.

If you are a manufacturer, there is one thing that you can do at once: Have your production men and planners consult now with the engineers of the basic machine tool producers. They can help you in planning ahead for the difficult task of reconverting your own skills and machinery to an all-out peacetime production.

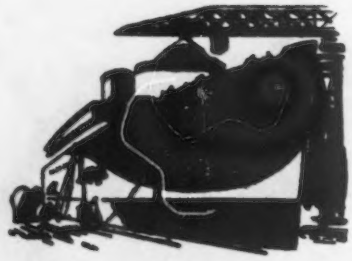
One of these engineers is a Bryant man. We urge you to call him today. For his specialized knowledge of internal grinding machinery is important to the manufacture of literally *everything* that will make this country a finer place: this is victory, a victory that it will be safe for our boys to come home to.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.

WEST COAST . . .

OSGOOD MURDOCK

• Operation of Lone Star, Daingerfield, Texas, furnace suggested to supply foundry pig and cheaper ballast, recoverable at full value . . . With another $17 million contract Kaiser contemplates four more open hearths.



LOS ANGELES—While Washington basic iron and steel materials officials of both WPB and OPA nonchallantly denied a shortage, as Kaiser Steel contemplated adding four additional open hearths to its present six at Fontana and thereby further taxing the iron demands on its single furnace, and while a house-to-house canvass was conducted by civic authorities in Utah to attempt to recruit workers for Geneva Steel's mines and mills, harried suppliers and desperate purchasers of foundry pig for the Pacific area hit upon the seemingly sensible suggestion that the new but unlit DPC furnace of the Lone Star Steel Co. at Daingerfield, Texas, be commissioned by WPB to run on foundry grade iron, to supply current needs and reasonably stockpile against future demand. This modern plant has by-product coke ovens now operating and a beneficiating plant and 110-ton furnace all dressed up with no place to go. Coal and ore are immediately adjacent, as at Birmingham, and it is believed that low operating costs under the technically expert direction of Dr. Geo. H. Anderson, executive vice-president, would permit shipment to the West Coast all rail so that pig iron could be landed and sold for something like $27 per gross ton, at which figure it is economic for foundry use. Moreover, it is understood that an increasing number of new freighters from the Gulf are being delivered to the West Coast in ballast, for which prudent and careful management would substitute pig. In fact, if Lone Star pig were permitted for the over 100,000 tons of ballast which will be required during the next six months for converted cargo ships on the West Coast, instead of dirty and eventually worthless concrete-ore concentrate, or contaminated scrap remelted into bars for over $40 a ton, as contemplated and in present process, an original saving of something like $15 a ton could be made, and the ballast would have complete salvage value when it had served its usefulness as such. Labor and facilities are understood to be provident and uncrucial at Daingerfield. Perhaps it is all just too logical for consideration in connection with the Alice-in-Wonderland planned economy by remote control of which the West Coast seems to be the constant and conspicuous victim.

As Permanente Metals Corp. announced closing of the Lathrop (Manteca) ferro-silicon process DPC magnesium plant which it has been operating for the past 18 to 20 months, Army Ordnance from San Francisco announced an additional $17 million contract to Kaiser's new but sizeable Shell Division. This is in addition to a $25 million award of a few weeks ago. The new operation will be performed exclusively at Denver, where now a considerable part of the Ordnance plant there will be taken over and trained personnel used in Kaiser operations. Both contracts involve forging and machining of 8-in. and 155 mm. artillery shells. The magnesium plant just closed should not be confused with the original Permanente Kaiser-owned plant near San Jose operated by the carbo-thermic process, which the company has consistently advocated as its long-run bid for a place in the light metals industry, and which continues to produce. The Lathrop-Manteca plant was an emergency reserve operation, sure but extravagant, and it is entirely in order that it be shut down now that magnesium supply balances demand it.

Washington officials insist that there is no extreme shortage of iron on the West Coast. They claim that no prospective buyer in that area has sought help from WPB in trying to get supplies of foundry iron. Other areas are tighter WPB says. —Ed.

FIRST major far West shipyard to switch to two shifts, was Consolidated Steel Corp., which revised its operating hours at Wilmington on Los Angeles harbor, starting Monday morning June 12. The first shift started at 6 a. m. and continued until 4:30 p. m. and the second shift terminated at 2:30 a. m. The change affected more than 17,000 workers. All women workers take one day off a week, to comply with the State law limiting the number of hours women may work.

Although announced "to speed production of combat transports," it seems evident that the change was a bid for critically scarce electrical workers, pipe fitters and skilled ship fitters. The overtime pay involved permits a substantial increase of take-home wages, and foremen and leadermen can be utilized to better advantage. Ambitious individual workers favor the change, but union leaders are apprehensive of cutting down the total number of jobs and proving that production can be maintained and even increased with reduced personnel when an incentive is involved. The change complicates public transportation arrangements, and makes it exceedingly hard for adjoining yards in the same area to continue to operate on three shifts or two eight-hour shifts. As Navy yards and repair yards increase their repair work forces, offering higher wage scales and often longer hours with more overtime opportunities, construction yards have increasing difficulty holding their skilled men and women. Victory ships, troop transports and the special craft now being constructed require more skilled and less new recruit labor than Liberty ships and landing craft which represented great volume up to six months ago.

At the harbor, which includes Long Beach, Wilmington and San Pedro, it is estimated that 14,000 additional housing units are still needed to help house and hold the necessary working force. Workers tire of an hour's drive or interurban car ride in each direction every day. One of the major Maritime yards takes 3300 new applicants per month, nearly 10 per cent of its entire working force, and

A Long Way in a Short Time

DURING ITS FIRST 25 YEARS
EX-CELL-O HAS MADE "PRODUCTION" HISTORY FOR THE NATION

Ex-Cell-O was founded a quarter of a century ago with a practical ideal—to bring to metal-working industries a new high standard for accuracy and speed in mass production. Steadfastly through the years it has progressed in this direction. Ex-Cell-O was the first company in the United States to design and manufacture and introduce for successful commercial use: *a precision ball bearing internal grinding spindle . . . a precision horizontal-type diamond boring machine . . . a precision thread grinding machine . . . a precision cylinder boring machine . . . a 1½ horsepower compact hydraulic power unit . . . a Diesel fuel injection pump and a universal-type Diesel engine nozzle . . . a machine to form and fill automatically square paper milk bottles in the dairy . . . Ex-Cell-O was also the first American company to undertake the mass production of hardened and ground precision parts for airplane engines.* If you are planning for tomorrow, when new standards will necessitate costs that are competitive, take advantage of Ex-Cell-O's wide engineering experience and extensive manufacturing facilities.

EX-CELL-O CORPORATION • DETROIT 6

SPECIAL MULTIPLE WAY-TYPE PRECISION BORING MACHINES • SPECIAL MULTIPLE PRECISION DRILLING MACHINES • PRECISION THREAD GRINDING, BORING AND LAPPING MACHINES • BROACHES AND BROACH GRINDING MACHINES • HYDRAULIC POWER UNITS • GRINDING SPINDLES • DRILL JIG BUSHINGS • CONTINENTAL CUTTING TOOLS • TOOL GRINDERS • DIESEL FUEL INJECTION EQUIPMENT • R. R. PINS AND BUSHINGS • PURE-PAK PAPER MILK BOTTLE MACHINES • PRECISION AIRCRAFT AND MISCELLANEOUS PARTS

of these 2600 can not find housing. The Navy is steadily increasing its force at the big new Roosevelt base. As public and military housing units are increasingly occupied, raising the standard, other workers are dissatisfied to travel long distances or continue to live in sub-standard or marginal homes. Public housing does not seem to have been well coordinated nor tied to necessary production in this critical area.

NEITHER iron nor steel foundries in this area are being pressed for orders, but all are pressed to keep up their unskilled labor forces. Base wage range is now from 75c. to 90c. an hour, for hard hot work. None is operating three shifts, some two and some one. Since this is a critical No. 1 labor area, as are all West Coast points, contracts are diverted eastward when possible and the WMC and USES referral plan discourages recruiting or the development of a labor reserve, so necessary for full foundry operation. At the present time there is an insistent demand for supplies for the oil fields and petroleum production trade, but such big, necessary staple producers as National Supply Co. at Torrance and Warman Steel Casting Co. at Huntington Park have great difficulty recruiting workers, maintaining production and accepting orders from commercial non-military and non-maritime buyers. It is roughly estimated that steel foundries of the Los Angeles area have a monthly capacity of 3000 tons and present production is from 60 to 75 per cent.

* * *

• **Pacific Tube Co.** first and only cold drawn tubular plant west of the Rockies is consistently producing 65 per cent of its ultimate capacity of 3,000,000 ft. per month of ⅜ in. to 2½ in. o.d. seamless. Equipment has just been received for welded tube forming, by both electric resistent and atomic hydrogen systems, and within 90 days production of 1½ million ft. per month of ½ to 4 in. o. d. welded tube may be expected.

* * *

• **As Consolidated-Vultee** completed on June 12 its 5000th Liberator B-24 bomber built at San Diego and the 7000th built by the corporation, President Harry Woodhead announced that by next January at Fort Worth and next April at San Diego production of the B-24 would be discontinued "to facilitate full production of larger and more powerful bombers now being tooled up." Ford at Willow Run and North American at Dallas will continue production of the Convair-originated B-24.

* * *

• **L. A. Parker, former president** of the local AFL Metal Trades Council, and later secretary of the Council of Federated Metal Crafts is on leave of absence and has joined the staff of California Shipbuilding Corp. as labor coordinator in industrial relations. He had been a former active member of the company's active Labor-Management Committee.

* * *

• **Although CIO aircraft** workers' representatives immediately urged Donald Douglas to advance his Fall transport plane schedules to prevent laying off 8000 workers as A-20 attack bomber schedules are terminated, calls for the 8000 poured in sufficiently to take care of several times that number of workers. Northrop was short 2000 at nearby Hawthorne. Consolidated-Vultee at San Diego had lost 5000 workers since January. The Aircraft War Production Council reported present needs of the aircraft industry as at least 11,000. And there were always bearish WMC and USES, an arithmetical maw always declaring human shortages running into five or six figures. There seemed no need for Presidential intervention to protect any "stay-ins" at Douglas.

Kaiser to Get Billets from Geneva

Denver, Colo.

• • • **Henry J. Kaiser** and Geneva Steel Co. literally "forged" into the lead as candidates for this war's strangest bedfellows with the announcement last week that Geneva would provide billets for a new $17,000,000 Kaiser shell contract to be carried out at the Denver Ordnance Plant. The new contract is in addition to the $25,000,000 contract awarded Kaiser several weeks ago. On this earlier contract, a forge plant will be built at Kaiser's Fontana, Cal., mill, but machinery and finishing operations will take place here. Kaiser moves into the Denver plant hot on the heels of Remington Arms Co., which will cease production of small arms ammunition there on July 31.

The earlier Kaiser contract approved for production 8-in. and 155-mm. shells, and the new contract is for 8-in. shell production. Both contracts are under the jurisdiction of the San Francisco Army Ordnance District.

The Denver Ordnance plant was started in February, 1941, and production of ammunition started that fall. The total cost of the plant was estimated at $50,000,000. Recently, production has been on a one shift per day basis.

For the contracts, Kaiser will take over two main buildings and a warehouse and will construct a new 70,000 sq. ft. forge shop for the more recent contracts. The Kaiser contracts run until June 30, 1945.

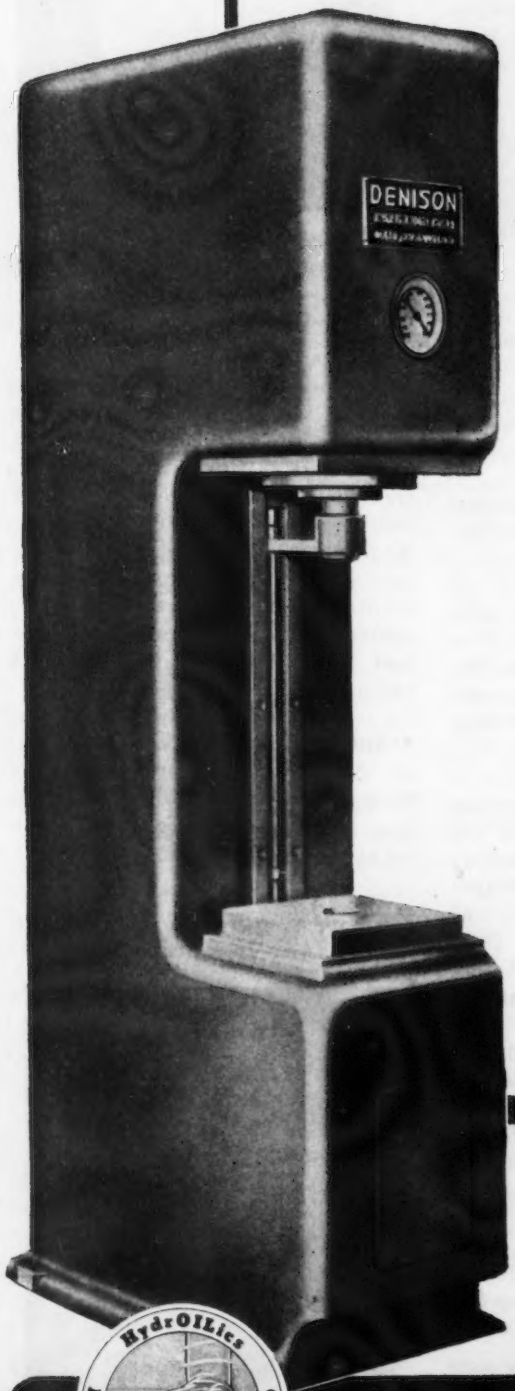
Availability of labor in the Denver area and its shortage in Southern California combined to bring the operators here. The Kaiser crew for both contracts will number about 2000.

. . . Cited for Awards . . .

• • • **The following companies** have won the Army-Navy E award for outstanding war production:

International Business Machines Corp., Endicott, N. Y. (second star)
Bullard Co., Bridgeport, Conn. (third star)
Fansteel Metallurgical Corp., North Chicago, Ill. (star)
Infilco, Inc., Chicago. (star)
American Machinery Corp., Marine Division, Beresford, Fla.
American Red Cross, Blood Donor Center, Louisville and Schenectady.
Andersen Corp., Bayport, Minn.
G. Barr & Co., Chicago.
Beach Mfg. Co., Montrose, Pa.
Bemis Brothers Bag Co., East Pepperell Plant, East Pepperell, Mass.
Burgess Battery Co., U. S. Battery Division, Freeport, Ill.
Burnham Boiler Corp., Zanesville Plant, Zanesville, Ohio.
Claude Neon Lights, Inc., Union Aircraft Products Corp., New York.
Electric Machinery Mfg. Co., Minneapolis.
General Electric Co., Syracuse Works, Electronics Department, Transmitter Division, Syracuse, N. Y.
Kold-Hold Mfg. Co., Lansing, Mich.
Lea Mfg. Co., Waterbury, Conn.
Lux Clock Mfg. Co., Waterbury, Conn.
Marshall Stove Co., Lewisburg, Tenn.
Powers Regulator Co., Chicago.
Rocky Mountain Arsenal, Chemical Warfare Service, Denver.
Sheldon Machine Co., Inc., Chicago.
Shell Oil Co., Inc., Wilmington Toluene Plant, Wilmington, Cal.
Sports Products, Inc., Cincinnati.
Springfield Woolen Mills Co., Springfield, Tenn.
Studebaker Corp., Studebaker Pacific Corp., Los Angeles.
Weldon Tool Co., Main Plant and Warehouse, Cleveland.
Wolverine Brass Works, Grand Rapids, Mich.
York-Shipley, Inc., York Oil Burner Co., York, Pa.

The press with Controlled Action for high-precision assembling jobs!



This DLAC2 HydrOILic Press provides *controlled action* — and more !

The pressure gauge accurately shows the tonnage being exerted at every stage of operation. The operator can easily see the pressure needed for maximum efficiency on each job . . . and quickly set pressure limits.

Ram stroke can also be quickly adjusted to the job at hand. And the press will deliver any pressure selected *regardless* of the stroke adjustment.

With stroke and pressure properly adjusted, the ram will travel *only* as far as required to complete the assembling operation — no more and no less — saving power and speeding production.

If desired, the operator can control pressure and ram stroke manually, as he goes, slowly or at full speed, steadily or in repeated thrusts, without pre-set adjustments.

The compact press mechanism is fully enclosed and protected by the rugged, space-saving, streamlined frame . . . extra toe-space is provided for operating ease and safety . . . all moving parts operate in a bath of oil. Electrical or manual control, hand- or foot-operated.

THE DENISON ENGINEERING COMPANY
1158 Dublin Rd. Columbus 16, Ohio

AVAILABLE IN 5 TO 150-TON CAPACITIES. Other HydrOILic Presses are built in capacities up to 200 tons. Write for complete information.

DENISON EQUIPMENT *for* APPLIED HydrOILics

PERSONALS

C. L. KINGSBURY, director, vice-president and general manager, Rustless Iron & Steel Corp.

• **C. L. Kingsbury** has been elected director, vice-president and general manager of the Rustless Iron & Steel Corp., Baltimore. Prior to joining Rustless, he had been controller of the American Rolling Mill Co.

• **John W. DeLind, Jr.**, has been appointed director of exports of the Crosley Corp., Cincinnati.

• **Robert J. Murray** has been elected secretary and treasurer of the Jessop Steel Co., Washington, Pa. Mr. Murray, who joined the company in 1925, has served in various capacities, becoming secretary and assistant treasurer in 1934. **L. C. Van Kirk** has been made assistant treasurer.

ROBERT J. MURRAY, secretary and treasurer, Jessop Steel Co.

• **C. P. Croco** has been made manager of a newly formed Welding Department of the Motor Division at the Trafford, Pa., works of Westinghouse Electric & Mfg. Co. **Theodore C. Monk**, who joined the Westinghouse Lamp Division in 1920, has been appointed assistant to the manager. **Harold B. Donley** has been made manager of the Radio Receiver Division.

• **A. G. Bussmann** has been made assistant to the president, Wickwire Spencer Steel Co., New York. He previously had been the assistant to the executive vice-president of the company.

• **Ralph C. Cameron** has been appointed director of merchandising for Airtemp Division, Chrysler Corp., Dayton. Mr. Cameron will continue to direct postwar planning activities of the company.

• **Charles Gross** has been appointed sales manager of the Murchey Machine & Tool Co., Detroit.

• **Thomas J. Connors** who has been with The Stanley Works Steel Division for 22 years has joined the Reliance Steel Corp. as special representative for the Bancroft Division, Worcester, Mass.

• **W. R. Hucks**, with the operating division of the Rubber Reserve Co. since 1942, has been named production manager of all government synthetic rubber plants. Mr. Hucks was manager of the Raw Materials Division of the B. F. Goodrich Co. before accepting the government assignment.

• **N. B. Lantz**, formerly industrial gas engineer with the Public Service Company of Indiana has been appointed manager, Standard Equipment Division, Dempsey Industrial Furnace Corp., Springfield, Mass.

• **George S. Forbes** has been made purchasing agent, Century Electric Co., St. Louis, and **W. F. Freese** has become assistant purchasing agent.

• **H. H. Tullis** has been elected controller of the American Rolling Mill Co. He joined the company in 1928, spent several years on special assignments in the Personal Relations and Controller's Divisions, and since 1936 has been assistant controller.

GEORGE S. MICAN, division superintendent, Carnegie - Illinois Steel Corp.

• **George S. Mican** has been appointed division superintendent of rolling mills in the South Chicago plant of Carnegie-Illinois Steel Corp., succeeding **Charles C. Hill, Jr.**, who has been transferred to the company's engineering department in Pittsburgh. Mr. Mican started his steel industrial career in 1919 as a machine shop apprentice and progressed steadily through various positions to his new post. Mr. Hill has been with the South Chicago plant since 1936.

• **Stuart F. Brown** has been appointed director of exports, American Brake Shoe Co., New York. He has been in charge of the company's Priorities Department since 1941.

STUART F. BROWN, director of exports, American Brake Shoe Co.

• **Frank W. Bemis** has been appointed sales manager of the American Cable and Hazard Wire Rope Divisions of American Chain & Cable Co., Inc., Bridgeport, Conn. He will make his headquarters in New York.

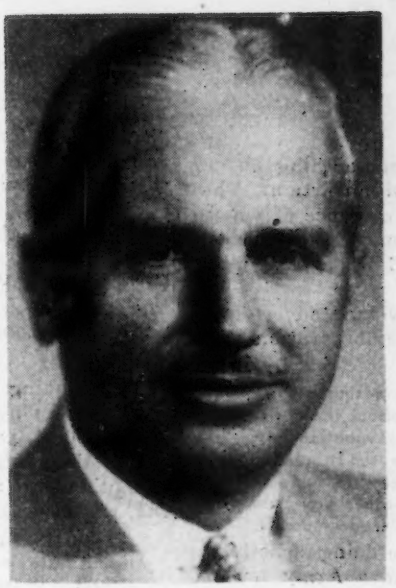
• **B. C. Anderson** has been appointed an assistant general sales manager of the Nash Motors Division, Nash-Kelvinator Corp., Detroit. **J. Frank Cox,** assistant manager in New York, has been made head of the Pittsburgh zone, replacing Mr. Anderson.

• **Erwin F. Garris** has been appointed head of the Sling Division, Macwhyte Co., Kenosha, Wis. He succeeds his father, the late Joseph M. Garris.

• **Wallace L. Nahin,** former St. Louis district manager, has been appointed general sales manager of the Vilter Mfg. Co., Milwaukee.

• **William A. Whiteside** has been elected secretary of Quaker Chemical Products Corp., Conshohocken, Pa. Mr. Whiteside has served the company for the past 12 years as personnel and office manager.

• **S. E. Heyerick,** has been appointed purchasing agent of the Ilg Electric Ventilating Co., Chicago.



WILLIAM KERBER, assistant to the president, Hanna Furnace Corp.

• **William Kerber,** formerly deputy assistant director of the WPB Steel Division, has been appointed assistant to the president of Hanna Furnace Corp., a company associated with Great Lakes Steel Corp., Detroit. His headquarters will be at Buffalo where he will also act as a special representative of the Great Lakes organization.

• **Leon A. Watson,** former vice-president and chief engineer, has been appointed vice-president in charge of engineering, development and research, The Clark Controller Co., Cleveland. Mr. Watson was one of the founders of the company in 1925. **John A. Cortelli** has been made chief engineer in charge of commercial engineering and the drafting department. He joined the Clark Controller engineering department in 1934.

• **Charles J. Symington,** president, Symington-Gould Corp., New York, has been elected chairman of the board and **J. A. Sauer,** executive vice-president, has been elected president. As chairman of the board, Mr. Symington will continue to direct the general policies of the company. Mr. Sauer, who has been with the present and predecessor companies for 35 years, will be responsible for operations in all plants at Rochester and Depew, N. Y.

• **Philip G. Nase** and **Henry J. DeBry** have been appointed directors of the H. L. Harvill Mfg. Co., Los Angeles. Mr. Nase, as eastern representative, has been with the firm since its incorporation; Mr. DeBry has held the position of secretary, as well as office manager, since its organization.

OBITUARY...

• **Arthur J. Brandt,** 56, president of the A. J. Brandt Co., consulting engineers, president and general manager of the National Tool Co. and board member of the Consolidated Vultee Corp., died in Cleveland, May 30. An internationally-known production engineer, Mr. Brandt had an industrial career marked by conspicuous successes in the rehabilitation of enterprises both at home and abroad.

• **Ernest W. Christ,** 68, vice-president in charge of purchases and a director and secretary of The Stanley Works, New Britain, Conn., died suddenly June 1.

• **John B. Tytus,** 69, vice-president in charge of technical development of the American Rolling Mill Co., Cincinnati, died recently. He was credited with the development of the continuous rolling process of iron and sheet steel.

• **Frederick J. Willits,** purchasing agent, Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., died May 27.

• **Harry B. Davis,** 66, treasurer of Steel Sales Corp., Chicago, died suddenly May 27.

• **Willard T. Hatch,** formerly engineer of power and construction for the Brown & Sharpe Mfg. Co., Providence, where he was employed from 1889 until his retirement in 1924, died June 3. He was 92 years old.

• **Charles S. Lincoln,** 59, chief designing engineer in the crushing, cement and mining department, at Allis-Chalmers Mfg. Co., Milwaukee, died May 30. He had been with the firm 39 years.

• **George S. Ligertweed,** consulting engineer of the Moore Drop Forging Co., Springfield, Mass., died May 29.

• **John R. Meehan,** vice-president of Phelps-Dodge Co. died June 1. He was 44 years old.

• **Allan H. MacCaffray,** sales representative of the Enterprise Galvanizing Co., Philadelphia, died May 26.

• **David L. Sacks,** president, Sacks-Barlow Foundries, Inc., Newark, N. J., died May 26.

• **Ira D. LeFevre,** controller of the General Electric Co. since 1935, died June 5. He was 60 years old.

• **George C. Llewellyn,** a member of the Jones & Laughlin Steel Corp. tinplate sales staff, died June 2. He was affiliated with McKeesport Sheet & Tinplate Co. prior to 1940, when the company was acquired by Jones & Laughlin.

• **John W. Robb,** vice-president and treasurer of the American Car & Foundry Motors Co., died recently, after a brief illness. He was 64 years old.

• **R. W. Hull,** manager of sales of the Carbon Bar Division, Republic Steel Corp., Cleveland, died suddenly May 29. He had served the corporation and its predecessor companies for 30 years.

• **Joseph M. Garris,** manager of the Sling Division, Macwhyte Co., Kenosha, Wis., died May 25.

• **J. Thomas Talbot,** an executive of the American Brake Shoe Co., New York, died suddenly June 6. He was 47 years old.

Fatigue Cracks . . .

BY A. H. DIX

More Beef, Fewer Creampuffs

• • • That the man in uniform wants nothing but a creampuff mental diet is merely a civilian fiction. The truth is that he craves roast beef, in evidence of which we reported here recently that an American soldier in an English hospital wrote his folks, "I wish I had some back copies of THE IRON AGE."

And now John C. Stephan, the Cleveland advertising agent and ex-Marine, makes the same observation in a letter to our Bob Blair:

> The hospitalized soldier gets tired of looking at Varga girls and eventually has a yen to read about the business he was in before the war, or about the vocation he intended to enter after the war—before he was struck down. This makes it necessary for him to keep up some kind of a contact, and he can do this in no other way I know about except through the technical and trade journals.

John and some of his associates are doing something about it. They are arranging to have Army trucks call at the advertising agencies, pick up back copies of the journals and deliver them to Crile and other northern Ohio hospitals containing war-wounded.

They think the idea should become national. So do we, for we hear that the few copies of technical and trade journals now finding their way to the hospitals and service libraries are being read to tatters.

No Faint Hearts

• • • When the whistle blows at five we always dive into the subway and home to Jersey. But Frank Oliver, your f.f.j.'s technical editor, who walks around and notices things, says the New York headquarters of the "MacArthur for President" movement still has its signs up in the windows of the Murray Hill Hotel on Park Avenue.

Call On Us Any Time

• • • Whenever we write to any of our Russian subscribers we always tack on a note of thanks for the superb work the Russians have done in softening up the common enemy. It seems to us only a mark of common politeness to express our appreciation, and we are happy to be on the receiving end of a similar note. A routine letter that just came in from Kavanagh & English Ptg., Ltd., a Sydney, Australia, household war manufacturer, belonging to the one big, more or less happy family, ends thus:

> Incidentally we take this opportunity of thanking the American nation for the prompt and efficient protection we have enjoyed from them.

Always glad to be of service.

Aptronym

> The biggest plumbing contractor in Vancouver, B. C., is Leek & Co., Ltd.

—*C. P. Love, Production Superintendent, Aluminum Co. of Canada, Ltd., Isle Maligne, Quebec*

We Pinch Hit for Peter Rabbit

> I called the other day on a plant owner who claims his three-year-old son is the youngest reader we have. After the copies go the rounds of the plant, the owner takes them home, and the child spends hours looking at the pictures.
>
> If he sees a picture of a locomotive or anything that looks like one, he gives a whoop and yells "Choo-choo!" Is that father proud!
>
> —*Sam DeWolf*

He shouldn't be. The child's precocity is cause for alarm rather than pride. If the father permits your favorite family journal to pinch hit for Peter Rabbit the child will mature with a mental hiatus. When he reaches man's estate he will realize that he was cheated when he was young, and will acquire a delayed Peter Rabbit fixation.

The result of this will be that in about 1962, when the father takes the son on as his assistant and says, "Read THE IRON AGE each week so you will know what is going on in the industry," the son will cheat the father by slipping a Peter Rabbit book in between the covers of this journal.

To prevent this we will send the plant owner a used Peter Rabbit book for his son, if Mr. DeWolf will give us his name. We will also send a child's book containing pictures of the latest choo-choos, gas-turbine-powered, of course.

Eyes Right

• • • Speaking of railroads, our one-man movement to have station names taken off the stations and placed about 100 ft. from the rails, so that they can be read as the train whizzes by, is now a two-man movement. The other half is C. B. Larrabee, president of *Printers' Ink*, the advertising journal, who writes:

> People whose work requires them to travel a lot in trains have an occupational ailment called "traveler's rightus." In trying to read the names on railroad stations the eye always moves rapidly to the right, which causes a slight cast toward the right. The right pulling muscles become so highly developed as to overbalance the left pulling muscles.
>
> I have had the ailment to the degree that since age 35 I have had to watch tennis matches from the end of the court.

Would some well-known optometrist like to head up the movement?

Jane and Henry Stayed Here

• • • We had another idea the railroads could use to create postwar employment. It was that signs should be put up to acquaint travelers with points of interest along the route. C. B. Larrabee has something to say about that, too:

> I am reminded of a grand idea that was used by the London and Northeastern Railway of England, and which added greatly to my pleasure on several trips between London and Edinburgh. They issued a book called "On Either Side." Down the center of each page ran a red line, representing the right of way. On either side of the line were marked the points of interest, with pictures and descriptions, such as:
>
> "The castle you see through the trees just after the train passes Colney Hatch is the residence of the Earl of Hurham. Jane Eyre was imprisoned here for eleven years during the War of the Roses, and it was a favorite recreation spot for Henry the Eighth."

A by-product of the book was the prevention of "rightus" by inducing the traveler to look out of both windows, thus giving right-pulling and left-pulling eye muscles equal work. Mr. Larrabee said he tried to sell the idea to some American railroads, but they were not interested, probably in the belief that there is something faintly indecent in the idea of alleviating the tedium of rail travel, like relieving the pains of childbirth.

Backward, Turn Backward

> It is anticipated that production facilities now available will tend to reduce appreciably the pre-war prices for . . .
>
> —*Technical journal advertisement*

Hang on to your old receipted bills.

Problems

Last week's match trick is solved this way: Move No. 4 to form an X with No. 1. That leaves nine positions. Take the match in the fifth position from the left and cross it with the match in the eighth position. That leaves eight positions. Now take the match in the new sixth position and cross it with the match in the third position. You now have X I X I I X I. From then on you can't go wrong.

You can set your own par for this brow-creaser:

A farmer leaves 45 casks of wine, of which 9 each are full, three quarters full, half full, one quarter full, and empty. How can they be divided among the farmer's five nephews so that each will receive the same amount of wine and the same number of casks, and at least one of each kind of cask. No two are to receive the same number of every kind of cask, and wine is not to be changed from cask to cask.

With the charge confined to a small area, fan-driven hot air at high velocity permeates the entire charge evenly, practically eliminating distortion, saving a great deal of space, and allowing quenching of the entire load without removal from the fixture.

heat full loads evenly in the Super-Cyclone

then quench 'en masse' to uniform hardness throughout

The Lindberg Super-Cyclone is a versatile and prodigious worker. Its ability to heat full loads to precise temperatures quickly and evenly throughout the charge increases production greatly, keeps work straighter, and allows in the same furnace either normalizing or annealing, hardening, tempering.

In hardening mass loads it was necessary to design quenching facilities to suit. The Super-Cyclone charge goes directly into the quench where oil is circulated under pressure right through the mass. Ample storage provides fresh cool oil and quenching is uniform throughout the load.

Each charge, fixture and all, is heated and quenched, with a saving in time, man-power and space requirements.

Write for complete information to Lindberg Engineering Company, 2452 W. Hubbard Street, Chicago 12.

ARMY E NAVY

LINDBERG FURNACES

SUPER-CYCLONE for hardening, normalizing, annealing, tempering
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening

Dear Editor:

BATCH, NOT BATH

Sir:

First of all, thanks to you for a nice bit of doing on Lindberg Furnaces at the Underwood Elliott Fisher Co. and the part they play in the production of carbines (page 46, May 25 issue). Secondly, I don't know whether it's "cricket" or not to call attention to a typographical error, but in column 3, page 46, the sixth line under "Heat Treating Practice," I'm sure you meant in all sincerity, "electric *batch* type furnaces," instead of "bath type furnaces."

DOUGLAS RADER,
Advertising Manager
Lindberg Engineering Co.,
2450 W. Hubbard St.,
Chicago

● "Batch," of course, was intended. A rebuke to the copyreader who missed the dropped "c."—Ed.

SPONGE IRON CASTINGS

Sir:

An application has arisen for which it would appear that the production of sponge iron castings from the cupola would be advantageous. Is there any literature on this subject?

H. KENNETH McGRATH
Alten's Foundry and Machine Works,
226 W. Wheeling St.,
Lancaster, Ohio

● No sponge iron is being produced in this country today but a plant is being erected by Republic Steel Corp. at Youngstown, Ohio, for the production of what amounts to sponge iron. This material will be used to replace scrap steel ordinarily charged into electric furnaces.

Sponge iron is iron ore reduced by gases below the fusion point of metallic iron and is quite porous and open in structure. The treatment thereafter is either to crush it into fine powder form for use in powder metallurgy processes or to melt it in an electric furnace with a mixture of pig iron or liquid iron. If sponge iron were run through the cupola and poured into molds, the result would not be sponge iron castings but cast iron.

Perhaps what you have in mind is a metal powder product in which some degree of porosity is obtained in the compacting of the powder when pressed in a die.—Ed.

GALV-WELD

Sir:

Please send us complete information regarding Galv-Weld process of re-galvanizing welded joints.

C. K. LE FIELL
Le Fiell Manufacturing Co.,
3301 Packers Ave.,
Los Angeles

● See page 66 of March 16 Iron Age or write to George H. Ohmer, Chief Engineer, Galv-Weld, Inc., Dayton, Ohio.—Ed.

FLY CUTTER MILLING

Sir:

I have just finished reading an article in your May 18 issue on "Hyper Milling vs. Fly Cutter Milling" by Gaylord G. Thompson and find it to be very interesting. I would certainly appreciate a clipping.

RUSSELL BALLENTINE
830 Howard St.,
Saginaw, Mich.

Sir:

I would appreciate your sending me two reprints of the May 18 article, "Hyper Milling vs. Fly Cutter Milling."

C. J. RUSSELL,
Foreman, Methods Engineering Dept.
Westinghouse Electric & Mfg. Co.,
Rafe Road, S.W.,
Canton, Ohio

STEEL DIRECTORY

Sir:

Do you have a list comprising all of the steel jobbers as well as the steel mills in the United States?

N. R. CERF
Wisconsin Steel Service Co.,
2249 N. 48th Street,
Milwaukee 8, Wis.

● We know of no one publishing a complete list of steel jobbers. A directory of steel mills is issued by Steel Publications, Inc., 108 Smithfield Street, Pittsburgh. Price $10.—Ed.

RETURNED SOLDIERS' ATTITUDE

Sir:

We have learned through an article in the *San Francisco Chronicle* that you have done a survey of former soldiers now working in Eastern and Middle Western factories.

We are very much interested in the results of this survey and wish to secure a more complete report of your findings. Will you please send us any material available?

CHARLES C. GIBBONS,
Director of Personnel Research
Owens-Illinois Glass Co.,
Toledo, Ohio

Sir:

Will you kindly let us have a copy of the poll recently made by your publication to determine what employment and economic demands returning service men may make?

This poll was described in May 24 issue of the *New York Times.*

CHARLES H. DUFTON,
Marketing and Survey
Bendix Aviation Corp.,
Baltimore 4, Md.

● See page 87, May 25 Iron Age.—Ed.

SAFETY COLOR CODE

Sir:

Your article, "Safety Color Code for Industry," on page 83 of the May 18 issue was noticed with interest.

We are interested in conforming to a suggested standard basic color code for industry and desire to have a reprint of your article.

G. T. MITCHELL,
Head of Machine Production Dept.
Ozalid Products Div.,
General Aniline and Film Corp.,
Johnson City, N. Y.

MONEL SCRAP

Sir:

Can you please direct us to several manufacturers that use Monel metal sheets so that we may contact them and endeavor to secure some Monel scrap metal?

OSCAR CROCKETT
Crockett Bit & Spur Co.,
Boulder, Colo.

● Hendrie & Bolthoff Manufacturing and Supply Co., 1621 17th St., Denver 17, is the distributor for Monel metal in your area and can probably direct you to sources of Monel metal scrap.—Ed.

MACHINABILITY

Sir:

In the issue of June 26, 1941, there was an article, "Microstructure and Machinability," by Dr. Woldman. Is it possible to obtain a clip sheet at this late date?

I am trying to get together information on machinability. I would appreciate anything you are in a position to send me.

J. P. DODS,
Director of Advertising
Summerill Tubing Co.,
Bridgeport, Pa.

● A clipping is being sent. Better drop a line to the ace authority on the subject, Prof. O. W. Boston, head of the Metal Processing Dept., College of Engineering, University of Michigan, Ann Arbor, Mich.—Ed.

SEIZED FOREIGN PATENTS

Sir:

Please send me the 28-page catalogue of "Seized Foreign Patents for Metal Products and Processes."

ALFRED C. GROSSE
Sentinel Tool and Engineering Co.,
3947 W. Lake St.,
Chicago

● The demand exhausted our supply of the 28-page list, so we have reprinted in one booklet all the lists of seized foreign patents published serially in The Iron Age. The complete list covers 48 pages. A copy can be obtained by sending 30c in stamps or coin to The Iron Age, 100 E. 42nd St., New York 17.—Ed.

RUSSIAN FIREBRICK

Sir:

An article in your June 8, 1943, issue (page 50) reports that due to the high content of free lime in Russian magnesite, its utilization in brick-making requires the "pretreatment of the clinker to eliminate the more active lime and magnesia."

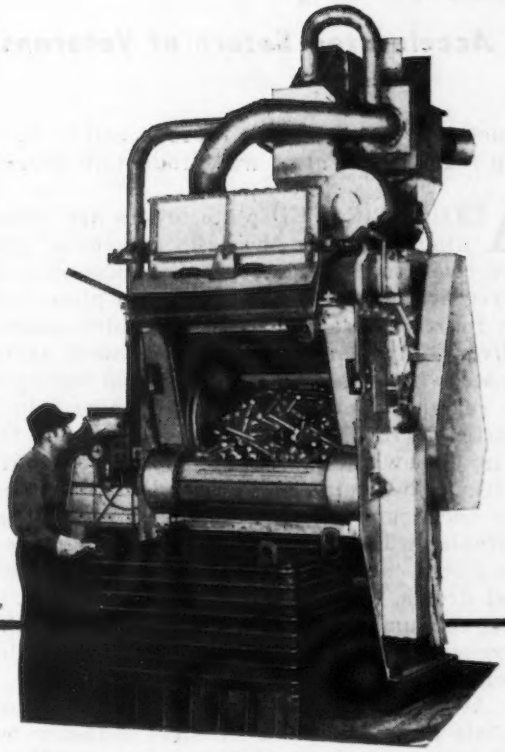
What in your opinion is the cost per ton of this pretreatment process?

B. GOURIN,
Economic Department
Amtorg Trading Corp.,
210 Madison Ave.,
New York 16

● We have no data on which to base an opinion. The author, J. H. Chesters, United Steel Companies, Ltd., Stocksbridge, England, may be able to help.—Ed.

AIRLESS *Whirlwind*

BLASTS CLEANING COSTS TO BITS



Wheelabrator Airless Blasting cuts time, costs and labor on metal cleaning operations.

Wheelabrator Airless Blasting is a "Whirlwind" of efficiency on metal cleaning problems. This "Whirlwind" throws a storm of 280,000 shot per second that no scale or surface dirt can withstand. The result is a smooth, bright finish right down to the virgin metal.

The bonus benefits of this are many: It speeds up machining and grinding . . . lengthens tool life . . . simplifies inspection . . . improves appearance . . . and provides a perfect bond for final finishing.

Wheelabrator not only speeds cleaning but it pushes down costs. Records of the low cost cleaning possible with this modern method show that the investment required is repaid the user within 6 to 18 months.

What are your metal cleaning problems? Let our engineers test-clean your work in our complete laboratories.

AMERICAN FOUNDRY EQUIPMENT CO.
510 S. Byrkit Street, Mishawaka, Indiana

WHAT USERS SAY

A PRODUCTION LIFE SAVER

"In view of the difficulty in securing satisfactory foundry help, plus the trouble in getting wire brush wheels, the Wheelabrator has been a life saver in keeping up production."
—H. Belfield Co.
Philadelphia, Pennsylvania

★

CLEANING COSTS SLASHED 31%

"We have cut our cleaning costs about 31% over the old sandblast equipment we formerly used. Our greatest saving comes from the shorter cleaning cycle plus the savings in abrasive that is effected with the new Wheelabrator."
—Kropp Forge Co., Chicago

★

VERY SATISFACTORY

"We are very glad to report that our Wheelabrator Tumblast has proved to be very satisfactory. We use it on our small steel forgings and it is a considerable improvement over the tumbling barrels formerly used."
—International Silver Co.
Meriden, Connecticut

★

DRASTIC REDUCTION IN COSTS

"We are now getting thoroughly clean, better-looking castings at a fraction of what this operation cost by our previous method."
—The Central Brass Mfg. Co.
Cleveland, Ohio

AIRLESS WHEELABRATOR SPEED CLEANING

This Industrial Week . . .

- ***Steel Demand at Peak Levels with No Change in Sight***
- ***Plate and Sheet Carryovers Mounting***
- ***Companies Planning for Accelerated Return of Veterans***

ENTERING the second week after invasion, steel demand continues at its over-inflated level of the past several weeks. Flat rolled (mainly plates) and shell rounds remain the number one critical items with carryovers running higher each month. Only the success of the war in Europe can be the determining factor that would cause a letdown in demand for these steel products. If that operation is brought to a speedy conclusion, then total steel demand for war items will be expected to decline sharply. However, until it is definitely known that the European phase of the war will be a short one, plans must be carried out to take care of any eventuality and hence war production will go along at the current peak rates.

In the past few weeks, demand and orders for steel have gained some over steel production. Recent steel ingot operating rates are about three points below the so-called 100 per cent of rated capacity. While such a decline has been expected by steel officials during hot weather, recent factors indicate that manpower shortages are also contributing to the inability of the industry to operate at maximum capacity levels. With hotter weather to come, with vacations expected to be taken at a greater rate than a year ago, and with the manpower shortage becoming more serious, earlier predictions of a five per cent or greater decline in steel output from recent levels appear to be sound.

THE actual invasion apparently did have a psychological effect of injecting new enthusiasm into war production as well as cutting down to some extent the number of unauthorized strikes. While there have been several wildcat strikes since the invasion started, the number and frequency in the past week has been somewhat below those occurring in pre-invasion periods. Whether or not this restraint on the part of rank and file workers will continue depends to a large extent on the news from abroad.

Steel order volume this week was maintaining a high level and, with most companies, continued to be in excess of shipments. Consequently unfilled order backlogs were unchanged or expanded. Steel is so tight that the WPB steel division recently found it necessary to deny the building materials division a request for 200 tons of carbon steel to substitute steel for wooden handles. More indicative of the tightness of steel this week are reports from various steel centers that indicate substantial carryovers on plates and sheets. On an overall basis steel carryovers at present are estimated to be running from 10 to 30 per cent of a month's output, depending on the company and the products that it manufactures. The exceedingly heavy demand for plates and sheets appears to be such that the only way in which carryovers will be reduced will be by cutbacks and rearrangement of war production programs.

AUTHENTICATED plate orders are already running well over the 110 per cent of production directives and the Maritime Commission is expected to require about 10 per cent more plate tonnage in the fourth quarter than in the third quarter. The delivery situation on plates this week is more extended with some producers booked solidly through the remainder of this year and others into the first quarter of 1945. The steel sheet situation this week is in somewhat the same position as plates with deliveries becoming more extended. Sheets naturally take the brunt of any expanded program on plates or tinplate. Except for such major programs as shell containers, ammunition boxes, landing mats, and steel drums, there are very few sheets left over for other consumers. Some steel plants have substantial carryovers on sheet bookings, running almost as much as one full month.

According to reports from Washington, WPB officials have been told by steel industry men that many companies would like to see CPM continue after Germany falls so that allotments would be handed out in such a way that each steel company will get its proportionate share of civilian business.

SPEARHEADED by the memorandum regarding the position of employers and employees under the National Service Act with regard to returning war veterans a survey disclosed that in the steel industry returning veterans are being assimilated and rehabilitated as fast as they come to the notice of steel companies. Two companies are known to have established definite policies with regard to this problem. Other companies as well as these two currently are handling each case individually as it occurs. This will be a continually growing problem as the war progresses and especially after it ends.

A tri-partite panel consisting of the public and labor members of the "basic steel" panel will hear the CIO demands on the 19 ore companies at the hearing which will begin in Washington on June 25.

Steel ingot operations remain unchanged this week at 97 per cent of rated capacity. Declines of half a point to 93.5 per cent at Pittsburgh and one and a half points to 100 per cent at Chicago are offset by gains of one point to 96 at Youngstown and half a point to 98 at Philadelphia. Other production increases have occurred in the western district, up three and a half to 99.0 and in the East, up seven and a half to 90.5. In Cleveland, output has dropped three points to 95.5 and in Detroit, the operating rate dipped one point from the revised rate to 99 per cent. Continuing at last week's levels are Buffalo at 106.5; Wheeling, 98; Birmingham, 99.

• **VACATIONS VS. PRODUCTION**—This year may see more workers taking vacation time off than last year. In past years many employees elected to work through and take the extra pay. However some workers have been working long hours and full weeks for more than a year. Whether or not programs can be staggered so as to have the minimum adverse effect on production remains to be seen. Some steel sources look for a substantial increase in the number of men taking vacations. Such conditions will accentuate the already serious manpower problem in that industry.

• **STEEL OUTPUT IN 1944**—In the first five months of this year steel production was more than 1,000,000 tons ahead of the same period last year. There is considerable speculation as to the total for this year. Earlier in the year many predicted less tonnage than in 1943 when an all-time record of 88,836,366 tons of steel were made. Then when war orders picked up instead of leveling off, the ante was raised with some analysts looking for close to 91,000,000 tons for 1944. The crux of the whole question depends on how long it takes to knock out Germany.

• **INVASION AND POSTWAR TALK**—After the first blush of invasion talk subsides there is bound to be more emphasis on reconversion and postwar plans. The magnitude of such conversion will depend on the progress in the new theaters of war. If conditions seem to indicate that Germany will be defeated in the next six months or so clamor for conversion plans will rise to a crescendo. This would be no more than natural in view of the tremendous cutbacks and cancellations in steel and other orders which would follow the end of the European phase of the war.

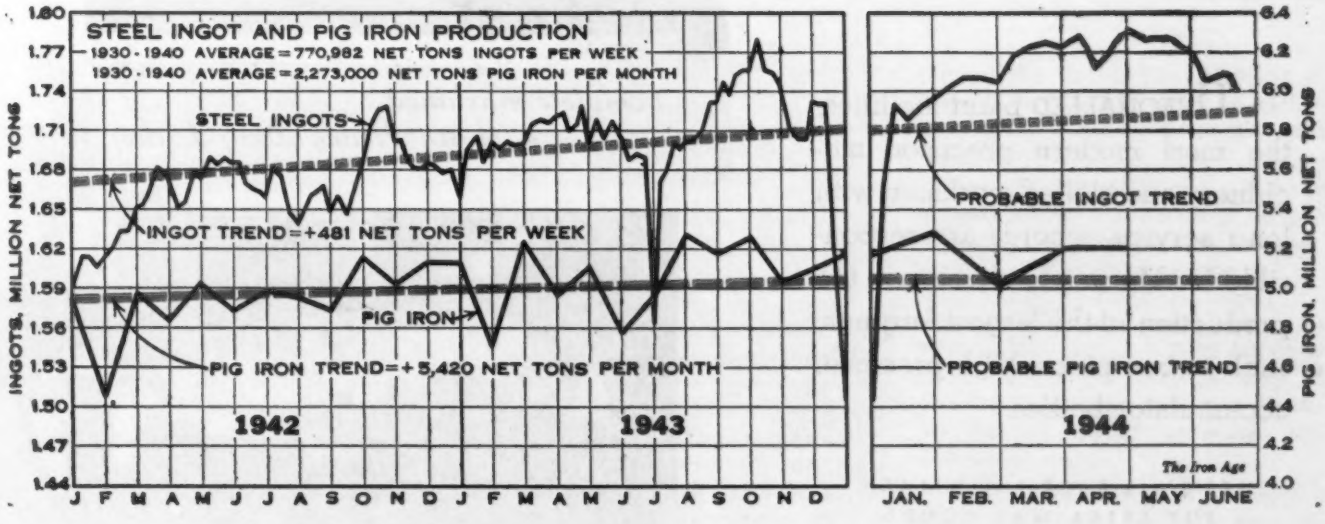
• **NELSON SAYS**—In spite of the excellent overall achievement of management and labor, all of us are aware that here and there shortsighted elements in both groups have defaulted on their obligations to the all out war effort. Too frequently, narrow group interests have been allowed to overshadow the war needs of the nation. Although these defaults are not representative of labor and management as a whole, nevertheless they are serious and deplorable. And unless they are stopped, they will do a grave injury, not only to the nation's production and morale during the war, but also to our chances of a prosperous postwar future.

• **BARUCH STUDIES RAW MATERIALS**—Bernard M. Baruch now has under study plans for postwar division of raw materials such as bauxite, iron ore, tin, diamonds, etc. This study when finished will be correlated with the findings of the interagency committee now studying cartels, one government source predicts.

• **WORLD TRADE**—Although Anti-Trust Division officials deny them, rumors are floating about that the Justice Department will offer an amendment to the Webb-Pomerene Act providing for validating international commodity agreements such as the one in oil now being worked out by this government. Many officials in Commerce and WPB feel that this must be done for the United States to successfully compete in world markets with countries whose business elements have more or less formed a partnership with their governments. Such an amendment would make legal government-supervised world division of markets and material supply.

• **PRE-INVASION LEND-LEASE**—In the 91 days from Jan. 1 to April 1 of this year, 3000 tanks and 90,000 other military motor vehicles including tank destroyers, trucks and jeeps were sent from the United States to Allied forces. This was 230 tanks and 6900 other military motor vehicles every week. A very substantial proportion of these shipments went to the United Kingdom. Large quantities went also to the Far East and Pacific theaters for the war against Japan, to the Soviet forces on the Eastern front, and to the Mediterranean theater, according to Leo T. Crowley, FEA administrator.

The Iron Age



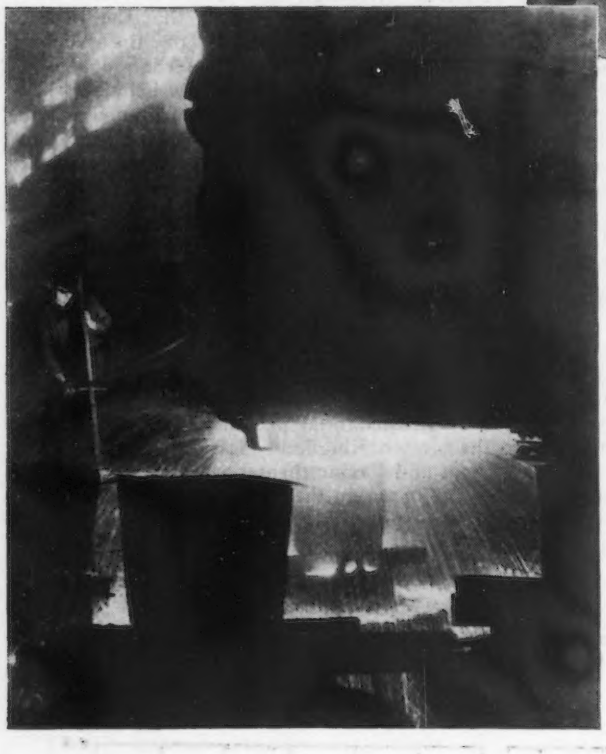
Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
June 8	94.0	101.5	95.0	97.5	98.5	108.5	98.0	99.0	100.0*	86.5	92.0	99.0	83.0	97.0
June 15	93.5	100.0	96.0	98.0	95.5	106.5	98.0	99.0	99.0	90.0	92.0	99.0	90.5	97.0

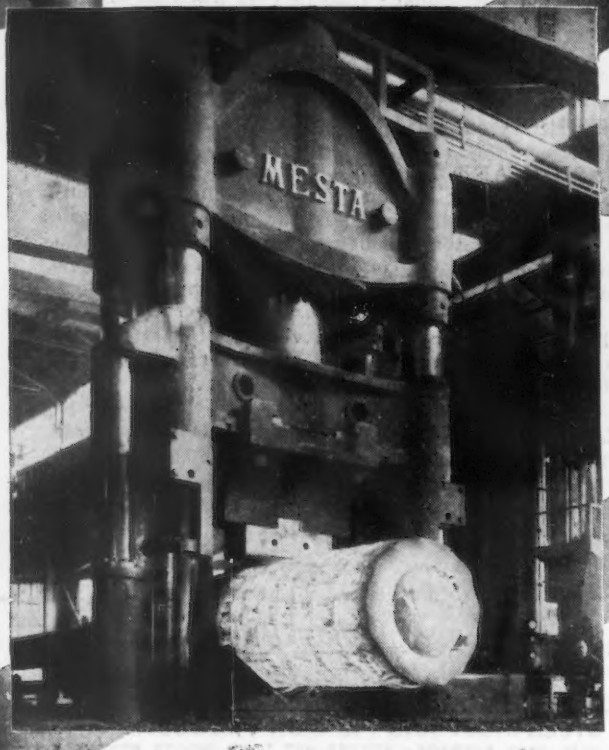
* Revised

MESTA ONE PIECE HOLLOW FORGINGS

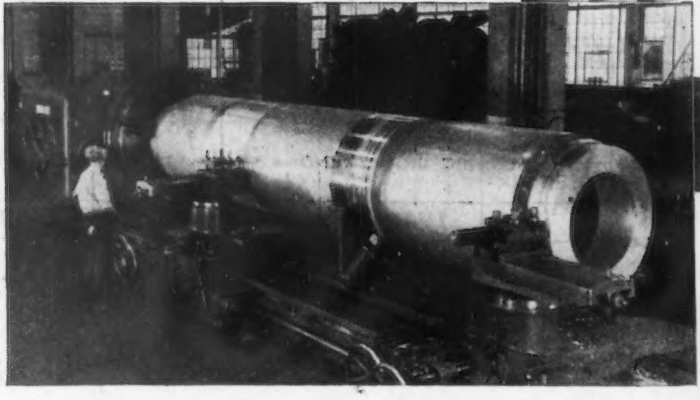
Hot ingots are poured in the Mesta Open Hearth . . .



Forged in a Mesta Pure Hydraulic Forging Press . . .



Complete machined in a Mesta Heavy Duty Lathe



UNEQUALLED plant facilities, the most modern precision machinery and skilled workmen with long service records are responsible for Mesta's leadership in the production of the largest forgings, such as one piece, high pressure, accumulator bottles.

LET'S ALL BACK THE ATTACK
BUY EXTRA WAR BONDS

The Army-Navy "E" Flag with four stars, flies over the Mesta plant

MESTA MACHINE COMPANY
Pittsburgh, Pa.

Steel Producers Begin Active Preparation for Re-employment And Industrial Rehabilitation of Returned Service People

Pittsburgh

• • • **The moment has apparently** come for industry and the government to begin to think actively and plan for the re-employment and rehabilitation into industry of returning war veterans. The government recently started the ball rolling with a memorandum outlining the principles to be followed in determining the permanent or temporary nature of employment and the problems affecting veterans' qualifications for reinstatement. Likewise, the steel industry is beginning to plan how to meet this problem when it arises. To date, the number of men returning has not been sufficiently large to cause much difficulty in placing them in jobs that they want and can do, and the current manpower shortages in practically every industrial and agricultural area has made the return of those few that have come back quite welcome.

o o o

THOMAS E. LLOYD
Associate Editor

o o o

However, with the developments of the past two weeks in Europe and the possibility that the war might be nearer an end than is now suspected, extensive planning is in order that these men will be gainfully employed on jobs that they can and want to do. While steel producers have, on the whole, done some considerable thinking about what should and could be done for the returning service people, as far as can be determined, there are only two companies that have come up with a definite plan or policy concerning this matter. Also, the CIO through the United Steel Workers of America has been working on such a plan, and it is expected this plan will be announced shortly.

Industry as a whole has a definite obligation and responsibility in the re-employment of these men. However, some of the rules regarding the re-employment of such men under the Selective Service Act will have to be more clearly defined. It is definitely the intent of the steel industry to abide both in letter and spirit by the law, but the present law makes that almost impossible.

As an example, a returned veteran can claim seniority rights for the time in active service in the armed forces. If, however, he had certain men under him prior to his induction, who, during the course of the time he was in service, were moved to various jobs throughout the company because of additional special training, the return-

ed veteran might well claim seniority over any or all of them. Likewise, if a veteran applies for re-employment within 40 days after release from the services, he is entitled to reinstatement. However, the Service Act places no requirement on the time that the veteran must actually begin work, and the veteran might conceivably claim that job years later. These, as well as some other vagaries in the Act, will have to be clarified before any headway on a large scale can be made in the reinstatement of returned veterans, and if clarification is not forthcoming, there will likely result a great deal of dissatisfaction on the part of the servicemen.

Individually, the steel companies are meeting the problems of returned servicemen as they come up. Up to now, all companies are handling each request for employment by these men as a new problem.

A general policy has been approved for Carnegie-Illinois Steel Corp., and will likely be the policy that is adopted by the entire U. S. Steel Corp. U. S. Steel as a whole has employed some 5000 ex-servicemen (about 5 per cent of the 100,000 company men in service). Not all of these were former employees, but the bulk were. Carnegie-Illinois Steel Corp., with 41,000 in service, have re-employed 2339 returned service men, 1701 of which were former employees and 638 of which were never before in the company's employ.

. . . With more than 70,000 veterans being released from the armed forces each month, the problem of re-employment has begun to assume sizable proportions. Now, there is work aplenty and to spare, but as the number of returning veterans increase and as contract cutbacks begin to lessen the need for manpower, the re-employment snarls will tie up personnel and labor relations.

Any program that is set up by industry or the government must take into consideration such practical aspects as:

1—Who must be rehired where several persons in succession have gone into service after holding the same job?
2—Must you rehire a former employee who quit your employ before induction?
3—Must you discharge employees taken on during the war if that is the only way you can make room for the returning veterans?
4—Does veteran seniority accumulate while in service, and, if so, how is this requirement to be applied in restoring the veteran to his former job?
5—When do "changed circumstances" relieve the employer of his obligation to rehire?

Jones & Laughlin Steel Corp. is developing some kind of a plan, but no official action has yet been taken on it by the company. With some 10,500 J & L workers in service up to April 30, 817 men released from the services have been employed by J & L. Each application for employment is handled individually, and one company official indicated that he believed any set policy now might work a hardship on returning servicemen. With less than 1 per cent of those in service coming back for jobs, there has been no difficulty in putting the men back to work.

Pittsburgh Steel Co. has set up a plan for reinstatement of service men, handling each case individually as it occurs. All jobs have been investigated and it has been determined what is required physically and mentally of men to do those jobs. As the men return, they are checked and the company is endeavoring to place each man on the job he wants to do.

Great care is taken to prevent any feeling by the returned veteran that he is being rehired. It is the desire of the company that the men feel that their return to work is much the same as it would be if they were off the job, ill, for a few days. The reason for this is to prevent the men from getting the idea that they must go through a great deal of red tape (with which any serviceman is quite familiar) to get something back that is already his. As of May 15, Pittsburgh Steel had re-employed every one of its former employees that sought employment after discharge and some veterans that were not formerly employed have been hired. A total of 163 discharged men have been employed, as against 2900 in service from the company.

Pittsburgh Steel reported that the bulk of the men coming back want and can handle their former jobs. However, in the instance of an occasional shock case or other incapacitating situations, such men are offered comparable jobs to those they left with the promise that when they are fit they can return to their old jobs if they want them. In this way, the men can be placed where they will not be able to harm either themselves or their fellow workmen.

An interesting angle in the rehabilitation of discharged servicemen is contemplated by Pittsburgh Steel Co. The company intends shortly to send a delegation to visit the new Deshon Hospital, Butler, Pa., an Army rehabilitation hospital, with the intention of selecting various men that are to be discharged soon for jobs with the company. In addition to supplementing the company's already depleted operating staff, these men will be under constant supervision that will aid them in rehabilitation.

Youngstown Sheet & Tube Co. has

IN THE MAKING: *Seabees join pontoon cubes on deck of "rhino ferry" under construction somewhere in England. The ferrys are being used in the turbulent waters of the channel where they are constantly under fire. They are part of the vast invasion armada and are manned by Seabees.*

not as yet had sufficient experience with returning veterans to term the situation a problem, and no set policies have been made. Each case is handled individually, and the men are returning to their former jobs. It was reported that there are no known cases to date at Youngstown Sheet & Tube of men returning that are unable, physically or otherwise, to handle their old jobs. Consequently, the company does not consider the situation at all difficult. They, like the other steel companies, are primarily desirous of doing all possible to get the men back to work.

Pittsburgh civic and educational leaders are likewise taking a stand on the veteran industrial rehabilitation problem. Dr. C. R. Hoeschst, director of extension education in the Pittsburgh schools, disclosed that plans had been made for the occupancy of a school building for a postwar educational center for veterans. Dr. John A. Nietz, president of the Pittsburgh Council of Adult Education and a member of the University of Pittsburgh staff, stated that money for the education and rehabilitation of veterans would likely come from the state or federal government, but the community would be charged with putting any such program into effect.

An informative and interesting bulletin was recently released by the Pittsburgh Chamber of Commerce on employment of discharged veterans and what is being done. Included were instructions on the obligations to former employees and non-employees that have been discharged from the services; the activities and facilities at the disposal of service men and women through local Selective Service Boards, War Manpower Commission Veteran Center, the U. S. Employment Service, and other agencies; and the role of the general public concerning this problem.

Some 14 practical suggestions were offered business firms and individual companies for developing a constructive program for handling the veteran re-employment problem. These suggestions were:

1—Assign the responsibility for the preparation of a plan and its administration to some individual.

2—Make a complete survey of present employment, determining the number of jobs now held by women, over-aged and temporary people who may be replaced.

3—Project your force requirements into the postwar period. Consider your probable activity and the number of people required to perform necessary jobs. Break down the total requirements by kind and type of job, work location and level in the organization.

4—Prepare an organization chart indicating the probable placement of returning veterans and the assignment of present employees to the extent they may be affected.

5—Review your requirements for the jobs you have. Consider the possibilities of utilizing the handicapped and impaired veteran. Job requirements that have been established for purely promotional value should be reconsidered. Take advantage of the knowledge and skills developed in military training and employ them where possible.

6—Survey the probable training requirements to help readjust the veteran to civilian life, to bring previous employees up to date in new techniques and changes in the business and to help new employees.

7—Enlist the aid and cooperation of your union representative. Discuss matters affecting union negotiations and contracts that may be involved in carrying out the program.

8—Establish a place and personnel where the veteran may find friendly and sympathetic interest and where he may be heard, interviewed and receive counseling. Provide fair selection methods and placement practices and show a genuine desire to be helpful.

9—Maintain contact with former employees now in service. Personal letters, round-robin letters, company periodicals and a package occasionally go a long way in backing up his morale.

PEEP-A-BOO: *At Camp Davis, N. C., WAC Pvt. Marie Striegal makes vain attempt to shake hands with a GI Joe in a 2½ ton Army truck. Marie is driving a "Peep", the tiny Army vehicle which is smaller than the well-known Jeep.*

When the day arrives that there are more men than available jobs, another problem arises. The following courses of action are listed as worthy of consideration:

10—Those whose advanced education has not been completed and those who have planned to attend colleges and universities but were prevented from doing so should be urged and aided, if necessary, to carry out their delayed program.

11—The hiring of young people under 18 years of age or until high school is completed should be discontinued as soon as the manpower shortage is relieved.

12—Persons should be retired who have been retained beyond their normal retirement date.

13—Women on mens jobs should be returned to their former fields of endeavor or transferred to jobs normally in their field.

14—The employment of veterans made possible by the release of short service employees, both men and women. Such action, however, requires thoughtful consideration by unions and management.

Draft Boards Have Re-employment Member

Cleveland

• • • **Capt. L. W. Argetsinger,** chief of veterans' personnel division, Ohio State Selective Service said that every draft board now has attached to it at least one member representing the veterans re-employment program. This member's job is to furnish the veteran with employment service, financial assistance, rehabilitation as required, hospitalization, or any related service.

Re-employment was stressed as the most important factor in rehabilitating the returning veteran and it was pointed out that Gen. Louis B. Hershey and Paul V. McNutt had already developed a joint plan through which veterans will be referred to jobs much in the same manner as now used by the USES The USES, incidentally, will do this referral job.

The services of the local draft board do not, however, end with the referral of a veteran to a job. The service will also follow through to see that the man is successfully and satisfactorily employed and permit him to come back for more satisfactory employment if first referrals are not successful.

In discussing the obligations of the veteran and the employer, Capt. Argetsinger said that the vet was not obligated to accept his former job and had the right to seek new employment if this seemed desirable.

Over-Allotments in Flat Rolled Products Indicate No Early Easing

Pittsburgh

• • • **The tight situation** in regard to flat rolled steel products has placed both the industry and the WPB in somewhat of a difficult position. The carry-overs that have been mounting monthly for the past three or four months are beginning to reach great proportions at some mills which are at the point where it is difficult to tell from day to day what directives will come in and upset rolling schedules which are already planned.

Plate orders on some mills are now running well over 110 per cent of the WPB productive directive that for many months determined the amount of plate the mills would schedule. (Since this figure for the WPB productive directive is based on productive capacity, with a 100 per cent productive directive totaling about 95 per cent of capacity, it can easily be seen that plate orders on these heavily loaded mills are well above 105 per cent of capacity.) Delivery promises on new plate orders are now running into 1945 for most of the major producers.

As to any early easing up of plate demands, this is quite questionable. During the early part of the second quarter, it was felt that the Maritime Commission would require less plates later in the year and the heavy demands of the early quarters were to clean up much of the Maritime work. It has not turned out that way because it is estimated at present that Maritime plate needs for the fourth quarter will be at least 10 per cent higher than during the third quarter.

The WPB has explained that less essential requirements will be trimmed out of the plate schedules, but it is felt by some observers that even this might not be enough, since plates have never had what could honestly be called "less essential users." Cutbacks in some major programs that require plates would help solve the problem, but it is up to the WPB and the armed services to decide what military production programs can stand cutting back.

The one big "if" in the plate production picture and in the war production picture as a whole is the European war. "If" the European war were to go suddenly against Germany or "if" the poundings on Germany and its army for the past two years has had its hoped for effect of reducing a powerful machine to a hollow shell, then the requirements of the Allied war machine will drop suddenly and fast.

However, while this is the hope and prayer of everyone, it cannot be counted on ahead of time, as the WPB and the armed services must prepare for the worst eventualities. The military agencies are living right with this European situation, and when they are certain that the end is in sight, retrenchment from the high material requirements will be extensive and fast. This is especially true of Army requirements. Navy and Maritime requirements will probably continue even after the war in Europe comes to a close, as will the requirements of the air arms of the forces, since the fighting yet to be done in the Pacific will have to be spearheaded by these services. There will be however some revisions in Navy and Maritime requirements when the European phase is closed.

Plants Set Up for Shell Production

Geneva, Utah

• • • **According to reliable** reports the plate mill of Geneva Steel Co. is now producing plates at the rate of about 600 tons a day. This, it is said, represents about one quarter of the scheduled peak.

The new structural mill which had once been halted but later reinstated will be completed probably by July with production started by that time. This mill will be used to help out on the shell steel program.

Currently two of the three blast furnaces are operating here and three of the nine 225-ton tilting open hearth furnaces are melting. Some trouble has been encountered in getting enough workmen and it is said that out of a full crew of 5000 workmen about 2800 have been hired. Broader scaled operations will be hampered as long as difficulty in obtaining manpower exists. Most of the manpower headache is in obtaining men for coke oven operations and coal mining.

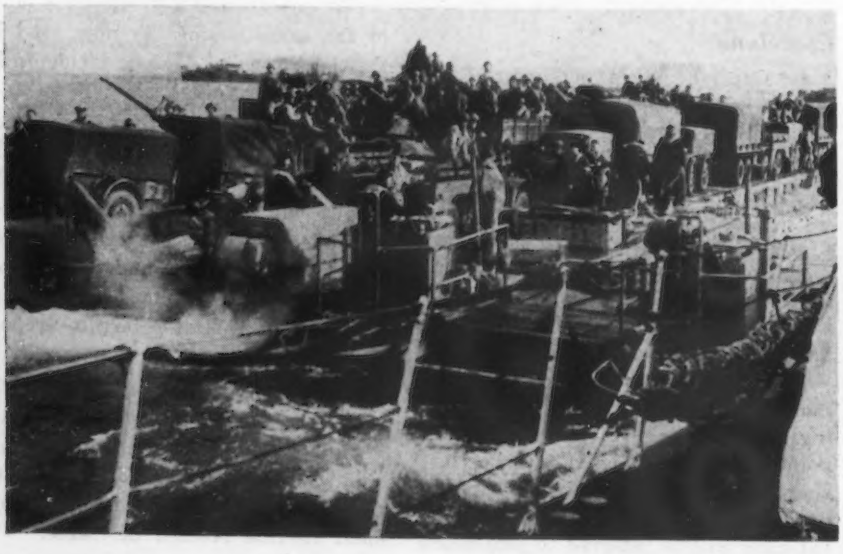
•

Chicago

• • • **Republic Steel Corp.'s** South Chicago DPC plant now has three out of four large tilting type open hearth furnaces melting. This plant will be utilized in the shell program. Previously there had been reports that the entire plant was to have been shut down but action along this line was reconsidered by WPB.

The 44-in. blooming mill has been in operation since last October. The 36-in. secondary blooming mill and the 32-in. finishing mill which will be used on the shell program are practically completed and ready to go.

INVASION FERRY: *A "rhino ferry" sets out for its objective somewhere on the English channel. The ferry is powered by two outboard motors and is loaded with an assortment of men, supplies and trucks. They have great functional strength and versatility.*



Iron Supplies Becoming Tighter Due to Repairs and Manpower Problem

Cleveland

• • • **Despite some** areas reporting merchant and steelmaking pig iron shortages, the possibilities of returning this commodity to allocation are considered remote, according to authorities here. The supply picture is spotty. Cleveland records no particular shortage but also claims no excesses, while the Chicago area is believed critically short, Pittsburgh is facing a tightening situation and the West Coast is known to be operating close.

The greatest single cause of pig shortages in certain areas appears to be the number of furnaces down for repairs. This is closely seconded by the shortage of manpower. Labor troubles have also had their part in lowering output of furnaces and coke ovens with resulting effects upon pig iron production. Worker efficiency is termed noticeably lower here by one source.

Pittsburgh is said to be suffering a noticeable shortage of steelmaking iron due to several furnaces being off. Carnegie-Illinois is reported to have two furnaces out in the district and the Ashland, Ky., furnace of American Rolling Mill Co. which has supplied most of the iron to the firm's Butler, Pa., mill is reported out with blower trouble.

Chicago is said to be close to a critical condition for iron, although no shut downs are looming at present. Greatest difficulty which is said to confront Chicago iron producers is the lack of manpower since Chicago is a critical labor shortage area. Heavy consumption of iron is also reported to be overburdening Chicago iron facilities.

In the event a real emergency arises some of the still unlighted DPC blast furnaces could be exploited. However, the locations of some of these would act as a stumbling block. Others have been built for use in connection with specific plants, such as the furnaces at the new South Chicago plant of Republic Steel Corp. and those at Geneva, Utah, and consequently would be of little assistance to outside consumers.

The problem of pig iron supply is not considered serious by any observers here as more than sufficient capacity is available although not always in the most desirable locations. The Cleveland area and most of the East is believed to be in a fairly comfortable condition which offsets to some extent conditions elsewhere. Many furnaces are being forced heavily through extensive use of blast furnace scrap to boost production. Although helpful for the present, in many cases this is shortening lining-life of furnaces to an extent that more furnaces may be expected to go down for re-lining within the next six months. Most feared of all, in estimating iron production, is the shortage of manpower. The hot, heavy work and relatively low wages of workers in these trades has discouraged many potential workers from seeking work of this kind and the prospects in this regard are not improving.

Limitation of Civilian Output Advised

Philadelphia

• • • **L. R. Boulware,** operations vice-chairman of the War Production Board, advised manufacturers to forget any grandiose dreams of civilian production immediately after the war and to concentrate on essential civilian production based on the 1941 scale, in an address before the American Marketing Association here recently.

The marketing industry, Mr. Boulware said, had an obligation to "realize the degree to which dependence must be put in the early stages of resumption on old products, and to act accordingly."

The WPB official told the marketers that two other principal obligations in the postwar period would be to provide enough production to absorb those made unemployed through the shutdown of war plants and to produce at a cost low enough to attract purchasers.

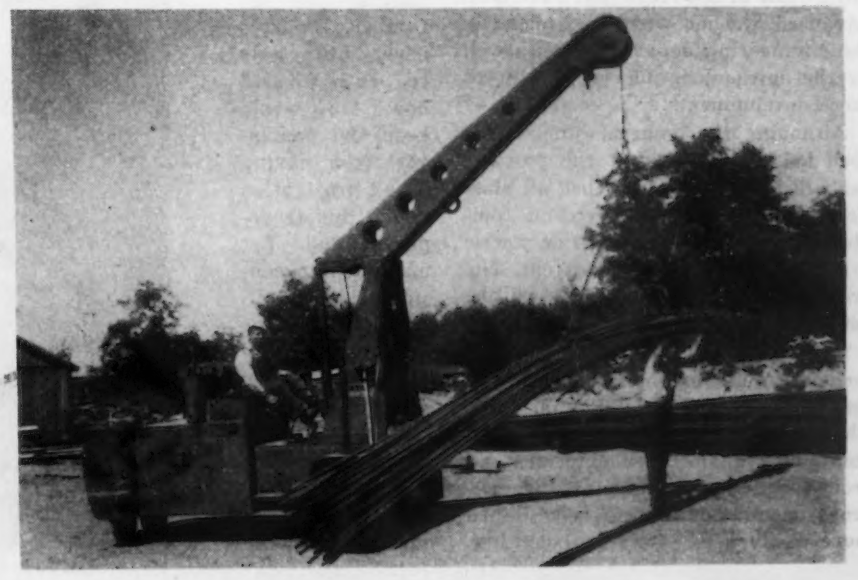
"There is presumably a vast seller's market for most civilian products, but not at prices that are far out of line with old conceptions of value," he said.

On the subject of plane production after the war, E. E. Lothrop, director of research for the Aeronautical Chamber of Commerce, ridiculed predictions that production for civilian consumption would reach 500,000 planes by 1950.

"We are unable to say in view of what the utility of the airplane is at present that we will see 500,000 aircraft in 1950 unless the utility of the airplane is materially increased," he said.

Wilson Wright, of the Armstrong Cork Co., who represented the producers council, predicted that public and private construction costs in 1950 would total $12,500,000,000 of which only $4,000,000,000 would represent government expenditures of all kinds.

DINOSAUR CRANE: *Operator looks unconcerned as high speed self-propelling utility crane hoists 10,000 lb. of steel at the Willamette Hyster Co., Portland, Ore., makers of Hyster Karry Kranes. Maneuverability is assured with four speeds forward and reverse. The monster crane lifts at a speed of 35 ft. per min.*



Brooks Stevens,
Industrial Designer,
Milwaukee, Wisconsin

"THE PRACTICAL

. . . will start with present designs and evolve from that point, with the rear engine as the possible ultimate.

° ° °

PASSENGER car appearance design has been evolutionary and comparatively gradual. The few excursions into the realm of radical departure from convention or the gradual trend have generally ended in acceptance failure. These brave pioneers were carried away by an extreme idea sold to them by a design department.

During the past year or two, we have seen the insidious rise and power of inaccurate or extreme prophecy in connection with the postwar motor car. General news articles and advertising have been written, interviews have been held, and considerable pictorial material has been presented over the signature of well-known stylists or industrial designers. Strangely enough, the wilder the prediction and the more fantastic the rendering, the more renowned the stylist seems to be.

Button pushing, remote control living, with hardly the necessity to think, flows smoothly from the orifice of his airbrush—flying automobiles, mechanical kitchens, refrigerators that literally hand you the food you want, and many other intriguing devices—yet all these must be engineered; some way must be found to manufacture them, to make them work, and considering some of the ideas that have been advanced, the job which lies ahead in the engineering department may well be the miraculous phase of any of these developments.

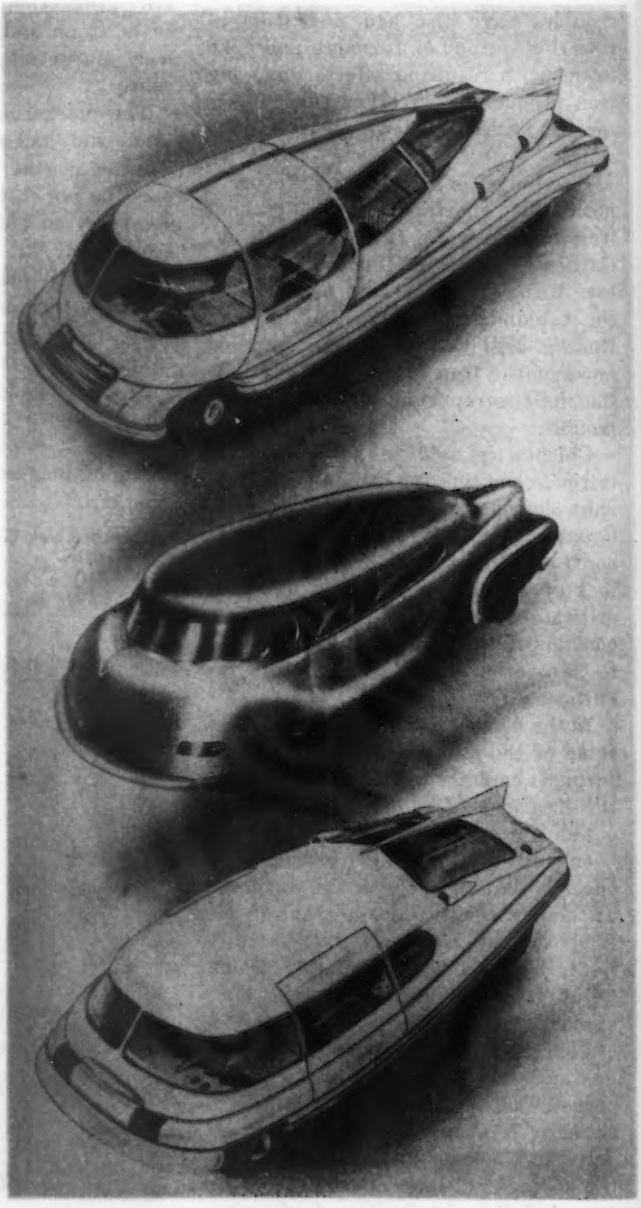
Although the general public has been led to believe that the postwar car will be a radically styled, all plastic, rear-engine vehicle with a completely transparent top, it is only wise to discount this to a great extent. The first postwar cars, undoubtedly, will be revisions of the 1942 models.

Reasonable revisions will, I believe, include greater emphasis on the elimination of individual fenders, as such. This makes for fewer individual stampings, a smoother exterior, and from a practical standpoint, the generous smooth surfaces can be reshaped more easily after accidental denting. Superfluous bright work, chrome grilles, stripes, and other useless ornamentation, which, as portrayed on the last prewar model, failed miserably from the standpoint of maintenance.

The corner windshield and door post has long been the bugaboo not only to the driver of the car but certainly to the designer and manufacturer. Yet, this condition cannot possibly be as easily solved as our prophets indicate in the one-piece, molded, tear dropped, plastic roof. The artist prophet blithely translates the generalities of the idea (aircraft turrets, plastic noses, observation bubbles, etc.) into the motor car showing a one-piece molded section comprising the roof, windows, and windshield all in one. No struts, or supporting ribs, or unsightly rivets, or anything as unromantic as that are used. Two of the transparent materials used today are Lucite and Plexiglas, which are most expensive and difficult to handle. To go further, I have never been able to understand how we would keep the passengers from having heat prostration under this transparent top. Let us take into consideration the all-important factor of consumer acceptance. How many American citizens would be psychologically secure while riding in this virtual goldfish bowl, despite its supposed advantages for vision? The last jarring detail in connection with the transparent roof is the showing of a Lucite window pane within the plastic door, closing with its surface flush with that of the top. Imagine one die cut edge of Lucite

(*Continued on page* 172)

. . . Two papers presented at the of the Society of Automotive bore the title: "The Practical gent views of the authors are tions of



POSTWAR CAR"

William B. Stout,
Stout Research Division,
Consolidated-Vultee Aircraft Corp.

. . . will be an easily handled auto-airplane combination, with detachable wings and steering wheel, gas foot pedal control.

o o o

THE real answer is in the hands of the public, since the public is the consumer. The public is going to determine what postwar products will be. However, the public has no imagination. It only knows what it wants after it sees it. To many manufacturers, the automobile will be the most attractive postwar possibility. If they operate on a small scale to start out with, however, they most certainly cannot compete in the price field with established automobile companies. Their only hope is to compete in the ingenuity field with a new product for a new appeal and creating new desires on the part of the car buying public. Such progress will have to be based on engineering: Better design, more economy, more luxury, better appearance, and new performances and pride values.

In this approach the present motor car companies have given the newcomer every opportunity. Their engineering is frozen, their engines, transmissions, bodies, axles, frames, steering gears are all standardized into types.

The airplane business has brought new materials to make lighter structures, and yet much stronger, and has at the same time learned how to make them cheap. Before the war there was but one method of mass production in the automobile business, from steel dies, gages, templates, blueprints, and engineering approaches. Each of these items has been completely revolutionized, largely in the airplane business where even at its top in bomber production one plane an hour was considered remarkable.

The airplane business has, therefore, learned to make simple replaceable dies, has developed cheap production practices. While the automobile business must think in terms of 20,000 cars a year, the airplane business can produce a fraction of that number of units but with no more die cost per car and, therefore, can start with new models every few weeks if necessary until they hit the one that takes the eye.

In the postwar, when we can get so much power in such light weight, we may follow two extremes. In one case we may drop back to the automatic two-speed gear with lots of horsepower so that we practically never have to shift gears. On the other hand, we may have small engines running at higher speeds and perhaps combine with the drive an infinitely variable gear which keeps the engine at its best speed at all times. I look to see great development in electric drives . . . in a new simplified arrangement.

Plastics today are expensive, but newer plastics coming along will compare per pound very favorably with any other material after fabrication.

The most startling postwar car will have wings. What I visualize as the eventual combination car and airplane is for the car to be no more complicated to drive than at present, minus all gear shifting. This same car, with wings to fly, will require as little skill as the motor car. The first necessity—not desirability but necessity—of the private owned plane must be that it cannot stall. In other words, it cannot be flown less than flying speed. There must be a better way devised than yet proposed in making a spin-proof, fool-proof ship.

There must be simplification of an airplane down to that of a motor car before the public can safely fly and I personally visualize a plane with just a steering gear with no fore-and-aft motion on it. When you turn the wheel around, the plane will bank and turn automatically in proportion to whatever speed of turn you make. When you want to climb, you step on the foot throttle a little harder; when you

(*Continued on page* 172)

National War Materiel Meeting Engineers at Detroit on June 5 to 7 Postwar Car." The widely diversummarized in these two condensatheir papers.

Urges American Industry To Shoulder Postwar Reconversion

Washington

• • • **Throwing the** responsibility for successful reconversion on the shoulders of American industry and lashing out at the apathy of certain industrialists in regard to government regimentation, WPB Chairman Donald M. Nelson told the House Special Committee on Postwar Economic Policy and Planning on June 7 that American postwar prosperity will have to be based on an expansionist economy.

Mr. Nelson's change of tune regarding postwar planning indicated either political thinking or his reaction to the successful launching of the European invasion.

On April 27 he loudly denounced the tendency to do too much postwar planning before the Senate Small Business Committee, while before the House Special Committee he emphasized the importance of postwar thinking at the present time.

According to Mr. Nelson, prosperity in the postwar era is dependent on the full utilization of the Nation's resources, and to achieve such utilization it is necessary to have prosperity in agriculture, consumer goods industries and capital goods industries. He felt that prosperity in agriculture would take care of itself, since it will be many years before a surplus of food exists anywhere in the world. Likewise, he pointed out that pent-up demand would insure prosperity in the consumer goods field. However, in capital goods the WPB chief said a great deal of thinking was necessary if this industry was to prosper. The only solution he foresaw was the development of a broad export market.

Mr. Nelson told the committee that WPB's job was not reconversion, but readjustment, since reconversion implies more than is included in WPB's powers. In response to Congressional queries he said that additional legislation is necessary if WPB is to carry out its postwar aims and offered to submit a memorandum containing his proposals to the group.

In reference to continuing controls in the postwar period, Mr. Nelson admitted that some control would be necessary but said "our plan is just the reverse." He looks forward to the release of large facilities when Germany is defeated and also a relaxation of controls.

The WPB Chairman said: "I would like to see in the postwar period only a minimum of controls that are absolutely necessary," with a constant view of removing even those few remaining. He pointed out that he wanted to see the widest possible use made of individual enterprise and initiative in reconversion, and expressed the view that anything counter to this, such as control of all industry from Washington, would do great damage to the American competitive system. He paid tribute to the "free enterprise" system when referring to war production successes, and said that WPB in its readjustment program would be careful to maintain the integrity of the system.

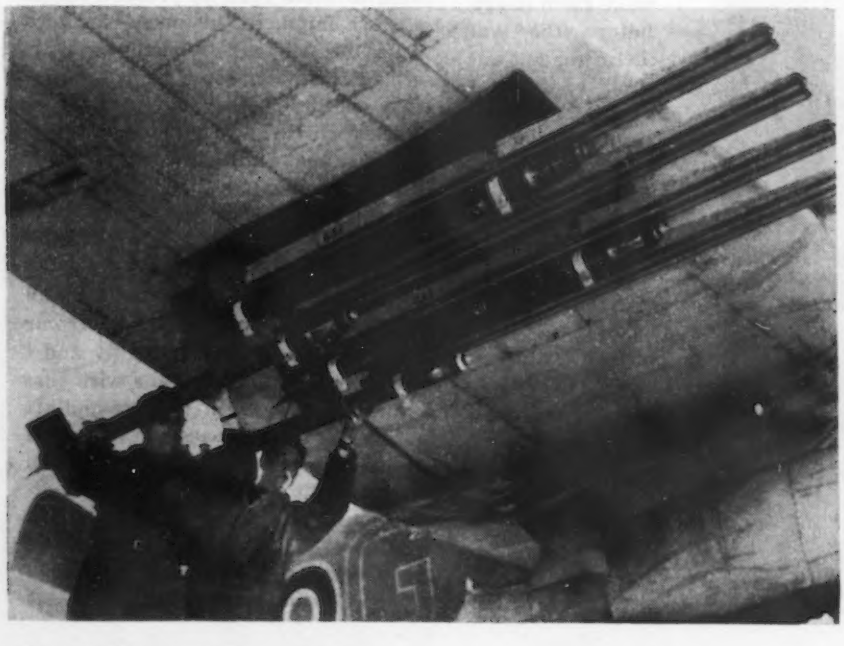
Mr. Nelson said that industry had an obligation to find uses for huge government-owned facilities and deplored the tendency for industry to come to Washington and throw its arms around government when contracts were cancelled crying "what shall we do?" He pointed out that tendencies of this nature would only serve to further tighten the bonds of bureaucracy.

Elaborating his discussion of the problems of the capital goods producers he said that if these problems were solved there need be no chaos in unemployment. In reference to foreign markets for capital goods Mr. Nelson was quick to indicate that he meant that exports of capital goods should be handled on a business-like basis, and not in an attempt to WPA-ize the world.

It was Mr. Nelson's belief that a case, such as confronted the Brewster plants recently, would not occur again, but that more cancellations would come and that determination of what should be done with these plants should be made by industry and not government.

The WPB Chairman told the committee that WPB will work with the services on stand-by facilities in determining whether privately-owned or government facilities were to be held, but would have no word as to the type of plants. He foresaw relatively few allocations necessary after the war with the possible exceptions of lumber and paper.

ROCKET EQUIPPED: *Ground crew members attach rocket projectiles on the guide rails beneath the wings of an English Beaufighter plane near the invasion coast. Four of the rockets are carried under each wing. They can be fired in pairs or together as a salvo of eight.*



Inland Sets New Record

Chicago

• • • **The Inland Steel Co.** in May at its Indiana Harbor plant established a new all-time monthly record in the production of ingots for war use.

During May, the company said, a total of 322,990 net tons of ingots were produced at Indiana Harbor, 3623 net tons over the firm's previous monthly high.

The record is regarded as outstanding because it was achieved in the face of a continuing huge turnover in manpower at the plant.

Youngstown to Pittsburgh Canal Project Attacked in Senate Minority Report

Pittsburgh

• • • **In a minority** report from the Senate Commerce Committee on the pending rivers and harbors bill which includes the authorization for a canal to be built from the Ohio River somewhere near Beaver, Pa., to Youngstown, Sen. Edward V. Robertson, Republican of Wyoming, opposed the construction on the basis that it would save the Federal government $50,000,000 outright and an additional $500,000 a year if the canal were not built. He stated that a railroad could be built joining the two points for far less money and criticized the omission of the cost to taxpayers in estimating the savings in water transportation.

The question of the canal brings up an old feud that has been pushed around for many years in Youngstown, Pittsburgh and Washington. Youngstown industry has always favored a short canal or what was termed a "stub end" canal that would connect that city with the Ohio River. In this manner, it would be possible to ship coal to Youngstown completely by water, eliminating the need for the barge to rail transfer and eliminate what has long been termed excessive ex-river rail rates on coal into Youngstown. (For a discussion of these rates see THE IRON AGE, Dec. 2, 1943, page 103.)

On the other hand, Pittsburgh steel producers through the Lake Erie and Ohio River Canal Board have independently favored a through canal to Lake Erie, so that it could take the advantage of water shipping rates on iron ore into Pittsburgh. The Lake Erie and Ohio River Canal Board, formed many years ago, was abandoned at the end of 1943 when the enabling act that was passed by the Pennsylvania State Legislature was repealed during the last session.

In addition to the industrial conflict over the construction of this canal, the railroads took a hand in the matter to protect their own rights. Through an organization known as the Upper Ohio Valley Improvement Association, organized about five years ago, the railroads opposed the construction of any type of canal, either through to the lakes or to Youngstown, on the grounds that its use would be seasonal and that the railroads could better handle such shipping, as facilities were already established for their use. To establish loading and unloading facilities for the water route would be both costly to industry and a duplication of something already existing.

This move gained considerable backing even in Pittsburgh, but pressure continued for a canal. The key to the whole problem could be summed up as: "If Youngstown should be given a position on the river, then Pittsburgh should be given a position on the lake."

While such a canal undoubtedly would follow the seasonal shipping pattern of the lakes, Pittsburgh steel producers maintain that its construction would be a boon to water shipping by giving that city an outlet to the Great Lakes. Furthermore, it is maintained that such a canal would cause a reduction in railroad freight rates and benefit industry throughout western Pennsylvania and eastern Ohio. It is admitted by steel producers that to move ore loading equipment from their present positions to the canal would be prohibitive in cost. However, any future developments in loading and unloading equipment along the lakes could be made with the canal in mind if it were constructed. In this way, the benefits of such a canal would not necessarily be overwhelmed by expenses incurred as a result of it.

In the minority report to the Senate concerning the "stub-end" canal, Senator Robertson stated that the total cost of the canal would be about $70,000,000 with yearly maintenance costs of about $630,000. Of this original cost, the government would have to supply some $38,500,000. Its main object, he said, was to enable large steel companies in Youngstown to get coal by water. While he asserted that he wasn't advocating the construction of a railroad by the government, he declared that a double track railroad over the proposed 35 mile route could be built for $15,000,000 to $20,000,000 and maintained for $130,000 a year, and if railroads were permitted to operate their equipment over the road without charge, freight costs would be even lower than canal charges.

U. S. Steel Sets New Record

New York

• • • **Shipments of finished** steel products by subsidiary companies of the U. S. Steel Corp. for the month of May, 1944, were 1,776,934 tons.

The May shipments compare with 1,756,797 net tons in the preceding April, an increase of 20,137 net tons, and with 1,706,543 net tons in the corresponding month in 1943, an increase of 70,391 net tons.

For the year 1944 to date, shipments were 8,895,085 net tons compared with 8,487,353 net tons in the comparable period of 1943, an increase of 407,732 net tons.

MINIATURE TANK: *Two British soldiers try out a miniature tank, captured from the enemy somewhere in Italy. The tank, of French make, can be operated by remote control and directed towards the enemy loaded with high explosives.*

WPB Establishes New Bureau Of Resale of Iron and Steel Products

Washington

• • • **Because it was held** to be inadequate in several respects, OPA has completely revised Appendix F of the regulation governing the resale of iron and steel products and extended to secondary or rejected flat rolled and semi-finished iron and steel products the "zone plan" for warehousemen in computing their delivered prices. The plan becomes effective June 17. This was declared to be a simpler pricing method and it was previously adopted for pricing of prime quality heavy line products.

Under the plan the country is divided into 17 zones, each of which corresponds generally to the usual market area of warehouses in the zone. The maximum delivered price for destinations within each zone is made up of the mill basing point price, freight, spread and extras. A "price component index" lists various products covered and refers to tables which the warehouseman uses to ascertain the value of the following factors which make up the maximum delivered price: Price at basing point, freight, spread, quantity, differentials, quality extras, size differentials, cutting extras and miscellaneous extras.

OPA said that its action establishes as the "price at basing point" a percentage of the mill base price for prime material. The freight factors are those established for prime material except in the two instances where prime material has not been included in the zoning plan. For tin mill blackplate and semi-finished products, however, freight factors have been established since none existed for primes and the bases used reflect the freight provisions previously incorporated in Appendix F.

Similarly, the factors for "spread" shown for secondary or rejected iron or steel products are the same as those for the corresponding products of prime quality. New "spread" factors are established for tin mill blackplate on the basis of the prices presently permitted by Appendix F. The "spread" factor for semi-finished products is expressed as a percentage and results in the same maximum price as heretofore.

The percentages of differentials for size and quality now established are identical to those set forth in RPS 6 (covering prices for producers). Provision has been made for warehouse grades not covered by the producer's schedule. The differentials for cutting, quantity and special operations performed by warehouses remain unchanged. These differentials reflect industry practice as of the base date, and bear no relationship to similar factors established for prime quality material at the warehouse level and for either prime or secondary material at the mill level. The allowance for waste is now determined as a percentage of all other factors included as a price rather than as a percentage of only base price and freight. This formula embodies the practice customarily followed by the industry.

Another feature of the new Appendix F is the extension of the definition of "secondary or rejected iron or steel products" to include products of less than prime quality at the time of purchase or sale as well as products which were purchased by or invoiced to the seller as other than prime quality. This broader coverage affords greater protection to the purchaser and prevents evasion through false invoicing. The list of products covered now includes all coated sheets, except tin plate and short ternes. Previously, only galvanized, galvannealed and long terne sheets were covered.

For the purpose of simplicity and ease of computation, size and quality extras are set forth in the Appendix.

WPB Establishes New Bureau On Stockpiling and Transportation

Washington

• • • **WPB has established** a Bureau of Stockpiling and Transportation. The bureau, to be responsible to the program vice-chairman, consists of the Office of the Director, a Division of Stockpiling and Shipping, and a Division of Transportation and Storage.

Edward Browning, Jr., of Bar Harbor, Me., who was acting director of the former Division of Stockpiling and Transportation, heads the bureau. Mr. Browning has worked continuously on shipping and stockpiling problems for WPB and its predecessor agencies since 1940, when he arrived in Washington to join the staff of the Advisory Commission to the Council on National Defense.

Edwin E. Frost, who was chief of the Stockpiling Branch of the old division, and F. J. Sette, formerly assistant division director, have been appointed, respectively, to head up the Stockpiling and Shipping and the Transportation and Storage Divisions. Both Mr. Frost and Mr. Sette have been with WPB since its formation.

The bureau, which will carry on the work of the division it succeeds, is specifically charged with exercising the responsibility of WPB with respect to the importation, stockpiling, transportation, and storage of commodities and materials necessary to the war effort and to the maintenance of the essential civilian economy.

Foundry Pricing Methods Announced

Washington

• • • **OPA has announced** a new alternative method for pricing "short orders" of gray iron castings. A "short order" is an order for a casting where the shipping weight multiplied by the quantity ordered does not exceed 200 lb. The new alternative method, effective June 15, permits a price per lb. for short order castings 2½ times the seller's average price per lb. for all gray iron sales in 1942.

OPA's action revokes certain provisions of Amendment 7 to MPR 244, effective March 1. That amendment permitted a seller to compute a ceiling price for short order castings by multiplying the shipping weight of the casting by twice his average price per lb. for gray iron castings in 1942 —and by adding a "starting charge" of $8 or $12 depending upon whether the casting was non-cored or cored.

The alternative method, in eliminating the starting charge, it was pointed out, should substantially reduce prices of the short orders of castings. The method provides the foundries with a simple way to compute prices and it was added that prices will be sufficiently high to encourage acceptance of short order business.

Manpower Rationing Plan Expected To Run into Acceptance Difficulties

Cleveland

• • • **The manpower** problem has become exceedingly acute here in the steel industry and many metalworking shops. Whether the manpower shortage is real is still debatable since workers appear to be available but not for the right jobs. The heavy and dirty jobs are going begging and in most cases the wage rates for these jobs justify the situation to some extent. The steel industry has lost approximately 32 per cent of its workers to the draft as compared with about 27 per cent recorded in other industries.

Womanpower is also becoming a missing factor. Recent statements by manpower officials indicate that women are quitting war plants and are returning to their homes rather than take any kind of employment. The release of small children from schools is seen as one of the factors in this movement.

The new manpower rationing plan, scheduled to go into effect July 1, is being viewed here with some cynicism. The difficulty with such a plan, most observers think, is that workers have a choice about disposition and capabilities, making it practically impossible to place any man in any job. While the choice of the employment accepted is still left to the discretion of the worker, the choice is becoming so limited that workers are not expected to accept any type of work temporarily to wait for the one best job.

There appears to be almost no compulsion suitable to the control of womanpower. The experience here has been that when a woman quits without an availability release she simply returns to her home and accepts no form of work. This is not particularly serious here as the greatest volume of workers still available are of the type best suited to light work. The release of high school students will also soon furnish a new supply of light workers temporarily.

Many workers leave positions and simply do not turn up for other employment. The time of year makes loafing or working on nearby farm land possible and some are thought to be doing both. It is also believed that some workers have already made as much money as they see fit under prevailing taxation and are laying off in favor of less easily traceable incomes rather than meet taxes.

The inflexibility of the newer labor regulations have also contributed to the indecision of some workers about accepting work. Each worker knows that once he has accepted work he is pretty closely held to the job and is looking with wary eye for the very best obtainable, considering nothing less.

Expect New Iron & Steel Directory

• • • **Steel men and steel** analysts will soon have the benefit of a new and enlarged *Iron and Steel Works Directory* which will be issued probably sometime in September of this year by the American Iron and Steel Institute. This will be the first edition since 1938. A proposed edition was held up a few years ago due to the war.

The new book, in addition to having regular information on the details of all steel companies in the United States and Canada, will probably have special reports showing breakdowns of steel capacity by private and governmental investment. It is also expected that there will be divisions which will summarize or capitulate the various types of steel capacity.

A timely feature of the book will be the fact that most of the steel expansion program is completed and the directory will have final information on capacity and location of new plants. All changes made at various companies since 1938 will be incorporated in the directory which will be of great help in sizing up post-war possibilities of the steel industry.

Latest figures on capacity for coke, pig iron and other raw materials will be incorporated in special studies. Listings of companies which make specific steel products along with the capacities will also be part of the directory as in past years.

WPB Approves Material For Fishing Vessels; Plants

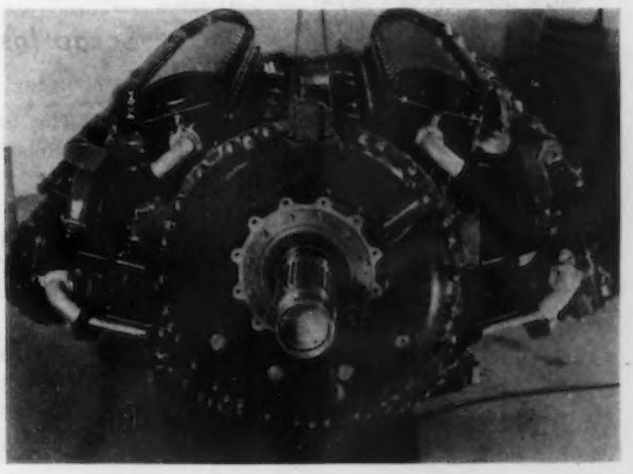
Washington

• • • **Acting on the** recommendation of the Office of the Coordinator of Fisheries, WPB during the 12-month period ended March 31, approved applications for more than $3,500,000 worth of controlled materials and products destined for use in fishing vessels, engines and shore processing plants. Included in the approved applications were 8835 tons of carbon steel; 425 tons of alloy steel; 1,480,350 lb. of copper products and 36,700 lb. of aluminum products.

Flatware Industry Quotas

Washington

• • • **WPB officials** have told members of the Flatware Manufacturers Industry Advisory Committee that steel quotas are being assigned to the flatware industry in the ratio of 35 per cent carbon steel to 65 per cent stainless steel. It was pointed out at the IAC meeting that the supply of chrome for stainless steel is so limited that further relaxations of restrictions on use for civilian items cannot be expected in the near future. An adequate supply of silver, WPB said, presents no problem.



POWER: *This "W" type aircraft engine, claimed to be the world's most powerful, is now in production by the Allison Division of General Motors. Turning up 3000 hp., the engine consists of two "V" arrangements, with four rows of six cylinders and weighs less than 1 lb. per hp.*

May Ingot Output Nears March Record

• • • **Steel ingot output** during May of 7,680,472 tons exceeded production of May, 1943, by about 131,000 tons, according to the American Iron and Steel Institute. The May, 1944, total compared with 7,568,530 tons in April and with 7,549,691 tons in May of 1943.

Cumulative production to June 1, 1944, 37,844,642 tons, was almost 1,000,000 tons in excess of output in the same period last year. The May production total was the second highest of this year, exceeded only by March when a new record was established.

Operations averaged 96.8 per cent of capacity in May. Calculated weekly production was 1,733,741 tons. Production during April averaged 1,764,226 tons per week, with operations averaging 98.5 per cent. In May, 1943, an average of 1,704,219 tons of steel was produced weekly and operations averaged 98.4 per cent of capacity.

Production of Open Hearth, Bessemer and Electric Steel Ingots and Steel for Castings

Based on Reports by Companies which made 98.3 Per Cent of the Open Hearth, 100 Per Cent of the Bessemer, and 87.9 Per Cent of the Electric Ingot and Steel for Castings Production. Source: American Iron and Steel Institute.

1944

Period	Estimated production—all companies: Open Hearth Net* tons	Open Hearth Percent* of capacity	Bessemer Net* tons	Bessemer Percent* of capacity	Electric Net* tons	Electric Percent* of capacity	Total Net* tons	Total Percent* of capacity	Calculated* weekly production all companies (Net tons)	Number of weeks in month
January	6,769,438	97.2	439,551	85.4	377,751	83.3	7,586,740	95.6	1,712,582	4.43
February	6,410,338	98.5	409,781	85.2	368,555	87.0	7,188,674	96.9	1,736,395	4.14
March	6,976,450	100.1	455,368	88.5	388,408	85.7	7,820,226	98.5	1,765,288	4.43
1st Quarter	20,156,226	98.6	1,304,700	86.4	1,134,714	85.3	22,595,640	97.0	1,738,126	13.00
April	6,768,895	100.3	437,517	87.8	362,118	82.5	7,568,530	98.5	1,764,226	4.29
May	6,860,532	98.5	438,980	85.3	380,960	84.0	7,680,472	96.8	1,733,741	4.43

Note—The percentages of capacity operated are calculated on weekly capacities of 1,572,755 net tons open hearth, 116,182 net tons Bessemer and 102,350 net tons electric ingots and steel for castings, total 1,791,287 net tons; based on annual capacities as of Jan. 1, 1944 as follows: Open hearth 82,223,610 net tons, Bessemer 6,074,000 net tons, Electric 5,350,880 net tons.

* Revised January through March, 1944.

1943

Period	Estimated production—all companies: Open Hearth Net* tons	Open Hearth Percent* of capacity	Bessemer Net* tons	Bessemer Percent* of capacity	Electric Net* tons	Electric Percent* of capacity	Total Net* tons	Total Percent* of capacity	Calculated* weekly production all companies (Net tons)	Number of weeks in month
January	6,576,788	97.8	478,161	85.9	369,573	95.5	7,424,522	95.8	1,675,964	4.43
February	6,031,605	99.3	447,810	89.1	345,189	98.8	6,824,604	98.5	1,706,151	4.00
March	6,787,902	100.9	503,565	90.4	383,111	99.0	7,674,578	100.0	1,732,410	4.43
1st Quarter	19,396,295	99.3	1,429,536	88.4	1,097,873	97.7	21,923,704	98.4	1,704,798	12.86
April	6,510,824	99.9	482,478	89.5	380,401	101.5	7,373,703	99.3	1,718,812	4.29
May	6,669,703	99.1	482,424	86.6	397,564	102.7	7,549,691	98.4	1,704,219	4.43
June	6,202,889	95.2	453,663	84.1	382,801	102.1	7,039,353	94.8	1,640,875	4.29
2nd Quarter	19,383,416	98.1	1,418,565	86.8	1,160,766	102.1	21,962,747	97.5	1,688,144	13.01
1st 6 months	38,779,711	98.7	2,848,101	87.6	2,258,639	99.9	43,886,451	98.0	1,696,423	25.87
July	6,556,794	96.8	466,345	90.6	384,737	91.9	7,407,876	96.2	1,675,990	4.42
August	6,700,118	98.7	484,847	94.0	401,499	95.7	7,586,464	98.3	1,712,520	4.43
September	6,646,968	101.4	480,757	96.4	386,614	95.4	7,514,339	100.7	1,755,687	4.28
3rd Quarter	19,903,880	99.0	1,431,949	93.6	1,172,850	94.4	22,508,679	98.4	1,714,294	13.13
9 months	58,683,591	98.8	4,280,050	89.5	3,431,489	98.0	66,395,130	98.1	1,702,439	39.00
October	6,892,029	101.6	513,585	99.5	408,503	97.4	7,814,117	101.2	1,763,909	4.43
November	6,543,204	99.6	440,878	88.2	387,893	95.5	7,371,975	98.6	1,718,409	4.29
December	6,502,980	96.0	390,979	75.9	361,185	86.3	7,255,144	94.2	1,641,435	4.42
4th Quarter	19,938,213	99.1	1,345,442	87.9	1,157,581	93.1	22,441,236	98.0	1,707,857	13.14
2nd 6 months	39,842,093	99.0	2,777,391	90.8	2,330,431	93.7	44,949,915	98.2	1,711,074	26.27
Total	78,621,804	98.9	5,625,492	89.1	4,589,070	96.7	88,836,366	98.1	1,703,804	52.14

Note—The percentages of capacity operated in the first 6 months are calculated on weekly capacities of 1,518,621 net tons open hearth, 125,681 net tons Bessemer and 87,360 net tons electric ingots and steel for castings, total 1,731,662 net tons; based on annual capacities as of January 1, 1943 as follows: Open hearth 79,180,880 net tons, Bessemer 6,553,000 net tons, electric 4,554,980 net tons. Beginning July 1, 1943, the percentages of capacity operated are calculated on weekly capacities of 1,531,789 net tons open hearth, 116,494 net tons Bessemer and 94,667 net tons electric ingots and steel for castings, total 1,742,950 net tons; based on annual capacities as follows: Open hearth 79,867,450 net tons, Bessemer 6,074,000 net tons, Electric 4,935,960 net tons.

* Revised January through December, 1943.

Orders Abandonment Of Basing Point System For Rigid Steel Conduit

Washington

• • • **Fifteen companies** were ordered by the Federal Trade Commission last week to abandon the basing point system in the sale of rigid steel conduit. The concerns involved are Clayton Mark & Co., Cohoes Rolling Mill Co., Enameled Metals Co., Fretz-Moon Tube Co., Inc., General Electric Co., Laclede Steel Co., National Electric Products Corp., Steelduct Co., Triangle Conduit & Cable Co., Inc., Walker Bros., Youngstown Sheet & Tube Co., Spang Chalfant, Inc., Republic Steel Corp., M. B. Austin Co., The Copartnership of Clifton Conduit Co.

The proceedings were also directed against the Rigid Steel Conduit Association, the National Electrical Wholesalers Associates and their officers, directors, and members who were charged with a price fixing and restraint-of-trade conspiracy through use of the basing point system, exchange of information concerning freight rates in quoting prices and other practices which they were ordered to cease.

The entire complaint as to the Central Tube Co., Garland Mfg. Co., Laclede Tube Co., Steel & Tubes, Inc., and F. C. Hodkinson was dismissed. The portion of the complaint charging unfair trade practices was dismissed against General Electric Supply Corp. and the charge of conspiracy against Clifton Conduit Co., and Spang Chalfant was also dismissed.

Scrap Institute Public Relations Committee Meets

Washington

• • • **The first meeting** of the new Public Relations committee of the Institute of Scrap Iron & Steel, Inc., has been called for Pittsburgh, on June 28, it was announced by Gerald M. Frank, of M. B. Speer & Co., Inc., Pittsburgh, chairman of the committee.

At this meeting the committee will consider a public relations program for the scrap industry for approval by the national board of directors of the institute which meets in Pittsburgh the following day. Efforts will be made by the scrap industry to continue the improved public relations attitude of the public toward the scrap industry which has flowed from the scrap industry's fine support of the war effort.

Arthur R. Robinson, of R. L. Batteiger Co., Philadelphia, has been made vice-chairman of the committee. One member from each of the 22 chapters of the institute has been appointed to the committee.

Do YOU KNOW THESE FACTS ABOUT THE USED MACHINE TOOL INDUSTRY ?

A $140,000,000 Market

In 1942, the annual turnover in used machine tools distributed by dealers was approximately 112,000 units, valued at about $140,000,000. (From figures compiled by the Research Council, Machinery Dealers' National Association).

A Soundly-Organized Marketing Mechanism

Thru mutual co-operation and interchange of information, America's leading used machine tool dealers, associated in MDNA, are ready to function as the most economical, practical means of redistributing surplus tools back into post-war industry.

Established Many Years

The used machine tool market had its origin practically with the advent of the machine age. Some dealer organizations are now in the second or third generation of family ownership.

Merchant-Technicians

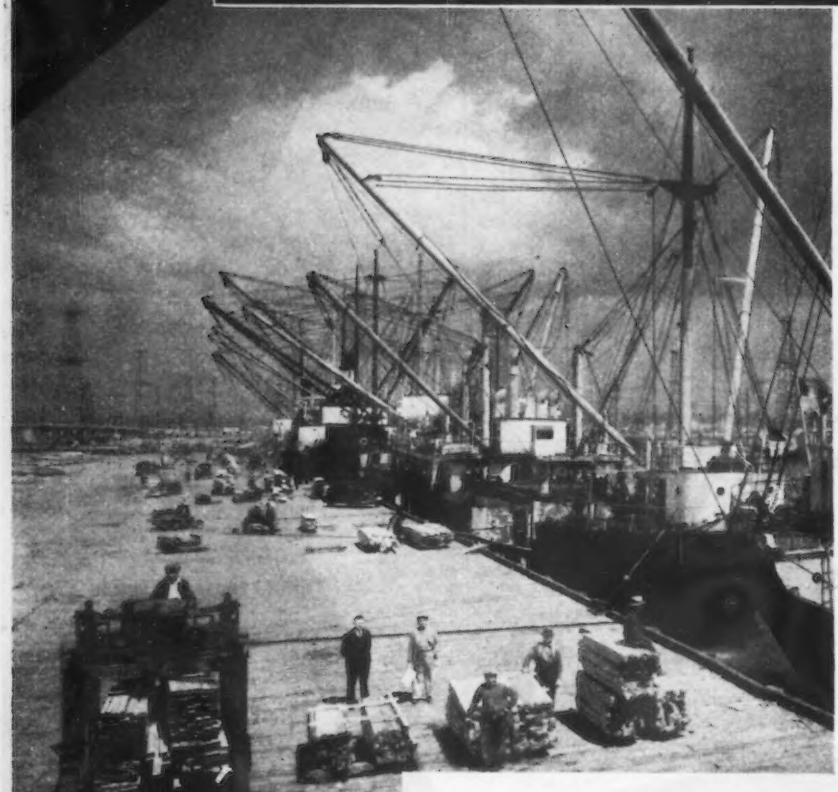
The successful used machine tool dealer must be more than a vender. In addition to knowing what, when and where to buy and sell, he must know the specific needs of his customers. Many MDNA dealers operate reconditioning plants which represent a substantial financial investment, and employ trained engineers and mechanics.

MDNA

MACHINERY DEALERS NATIONAL ASSOCIATION

20 N. WACKER DRIVE **CHICAGO, ILLINOIS**

The ROSS CARRIER —An Economy-Link in Marine Shipping



Warehouse, yard, dock — all are economically linked by the Ross Carrier and its unit-load handling system. Wherever materials and cargoes can be transported in units or "packages" — Ross Carriers and Lift Trucks can handle them faster and at minimum cost . . . Keep materials moving. Write for Bulletin I-64.

The ROSS CARRIER COMPANY, Benton Harbor, Michigan

Branches: San Francisco - Seattle - Portland - Vancouver, B. C. - New York City - Hoboken, N. J.

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HEAVY DUTY MATERIALS-HANDLING EQUIPMENT

BENTON HARBOR • MICHIGAN

Mobile Steam Power Train Presented To U.S.S.R. in Ceremony

Berwick, Pa.

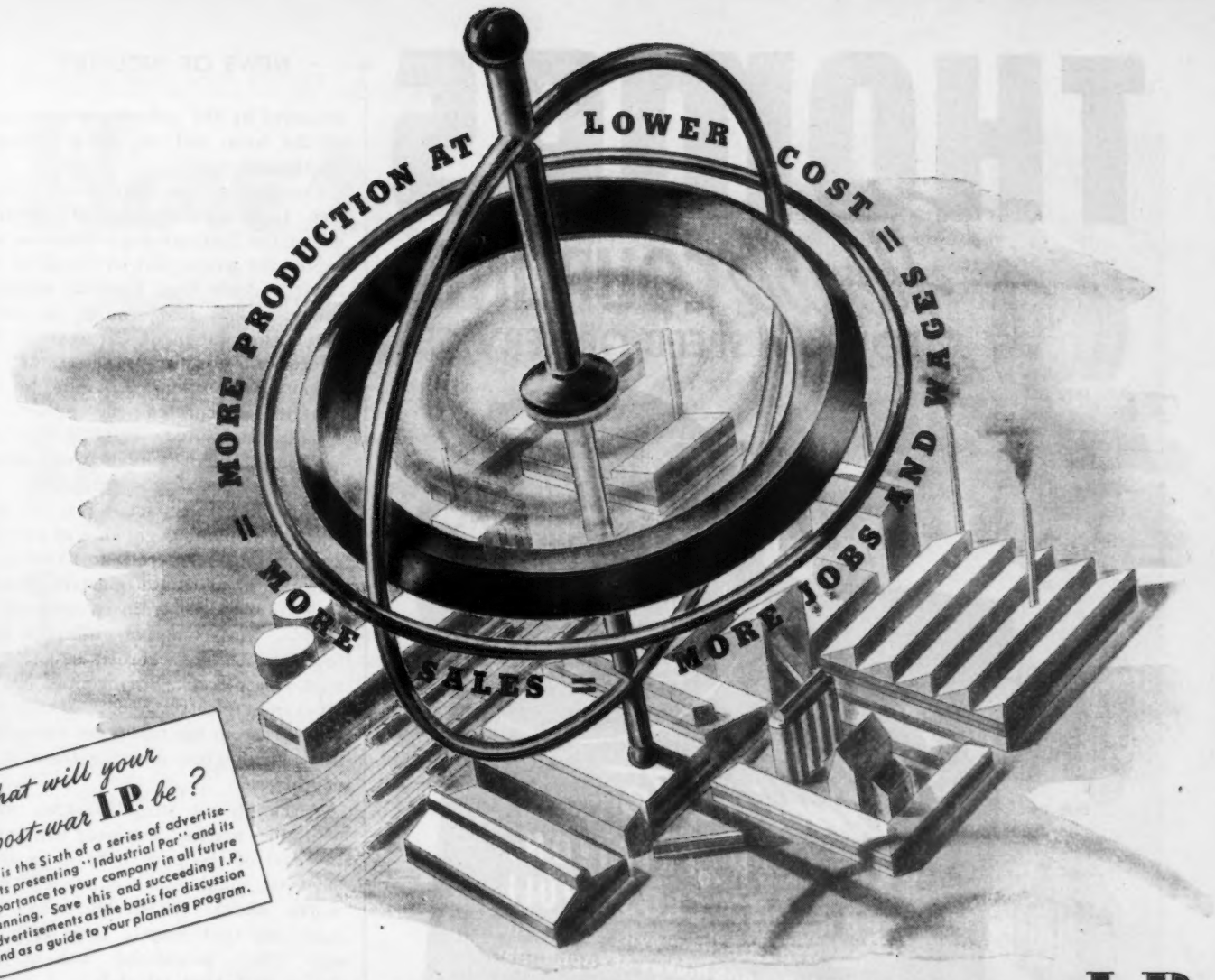
• • • **Less than an hour after 1500** remaining workers of the American Car and Foundry Co. walked out in a wildcat strike at the assembly plant here, the first unit of 40 mobile steam power plants was presented to the Soviet Union in a short ceremony marked by the attendance of high Washington officials and representatives of the Soviet Union.

Sudden rain drove guests, officials

ENERGETIC RUSSIAN: *Lieut. Gen. L. G. Rudenko, chairman, Soviet Government Purchasing Commission, beams as he voices his country's thanks for the mobile steam power train presented to the U.S.S.R. recently at Berwick, Pa.*

and the Russians into the stilled assembly plant room where attendants hastily constructed a podium out of used steel crates. Directly overhead a black and white sign proclaimed "The USWA Has Taken The No-Strike Pledge."

Charles J. Hardy, chairman, American Car and Foundry Co., opened the event with a short address of welcome to the invited guests. C. H. Minor, president, International General Electric Co., after having difficulty boarding the speaker's platform, delivered the presentation speech. The address of Mr. Minor was somewhat



What will your †† *post-war* **I.P.** *be?*

This is the Sixth of a series of advertisements presenting "Industrial Par" and its importance to your company in all future planning. Save this and succeeding I.P. advertisements as the basis for discussion and as a guide to your planning program.

Keeping the Business Gyroscope Balanced Is All a Matter of I.P.

Remember the gyroscope you had as a kid. You gave it a flip with a bit of string and there it stood spinning and gracefully balanced. As it lost its spinning momentum it began to wobble, and finally, as its motion was spent, it just keeled over.

That toy gyroscope symbolizes an important principle in the making and selling of goods. When we are able to produce more at lower cost we sell more. When mechanical refrigerators cost about $400, they sold at the rate of 50,000 a year. When lowered production costs brought the price down to around $160.00, a million and a half were sold every year. Increased sales call for increased production and increased production means more jobs. More jobs and wages, in turn, contribute to making more sales possible and those, in turn, mean even greater production at still lower costs. As long as nothing disturbs the cycle the wheels of business and industry keep spinning in balance, like the gyroscope.

To produce more at lower cost calls for increased output per man-hour. America's industrial greatness was founded on the fact that we were able to increase our output per man-hour progressively through the years.

In fact, we have established a national industrial par — a constantly increasing output per man-hour equal to approximately 50% every 10 years. Our ability to maintain or excel this industrial par sets our level of national prosperity.

To increase output — to make better products at lower cost — demands production engineering skill, implemented with the best and most modern machine tools.

Machine tool productive power today is one-third to one-half greater than it was in 1939. Their increased effectiveness springs from vastly improved design and performance, rather than sheer numbers in use. Only with the most modern machine tools can any manufacturer hope to compete successfully over a period of years — make workers' jobs safer — more productive — more secure in the postwar days to come.

Let's All Back the Attack! **BUY MORE BONDS**

Spotlight facts for your post-war **I.P.** *planning*

*Production methods — developed in wartime — increase man-hour output; pent-up buying power — released in peacetime — demands increased production.

*The rate of 2½% increase per year output per man-hour, established by a 12 year record of industrial production, can be expected to reach at least 4% per year — compounded.

*Manufacturers must set a goal of 50% increased output per man-hour every 10 years — to maintain a high level of national prosperity and achieve its benefits in terms of security of jobs and wages for the greatest number of workers and the volume production of more goods for more people at lowest cost.

*Machine tools — the most modern, most efficient — are recognized as the most effective implements of mass production and increased output at lowest cost — but only continual replacements with the newest and finest machine tools assures full productive capacity. *Such replacements yearly should be equal to 10% of the total machine tool investment — in keeping with increased output.*

*The cost of machine tools is insignificant in terms of their productive power . . . from 1927 to 1937, according to census reports, American manufacturers had only a total of about 2% invested yearly in machine tools in ratio to a total volume of 9 billion dollars' worth of production annually.

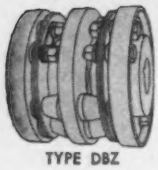
†† **Industrial Par** — *the constantly increasing output per man-hour equal to approximately 50% every 10 years.*

Milwaukee Machine Tools

KEARNEY & TRECKER CORPORATION

MILWAUKEE 14, WISCONSIN

THOMAS
Flexible COUPLINGS
FOR *any* SPEED OR SERVICE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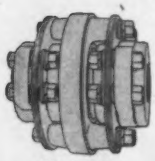
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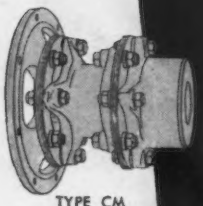
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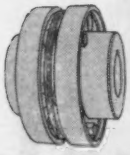
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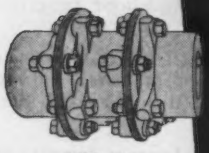
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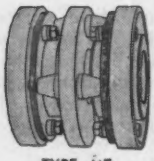
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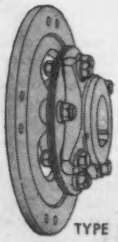
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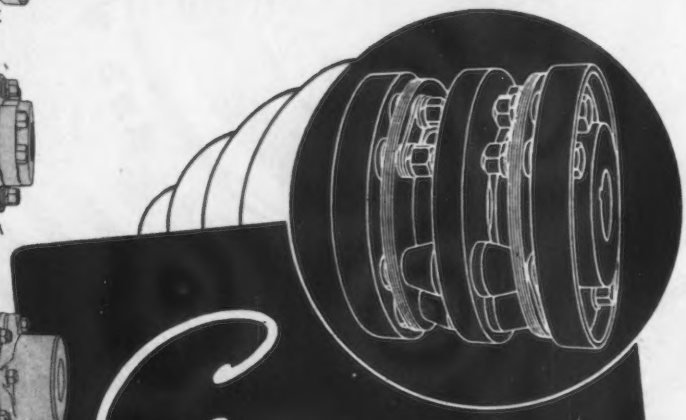


Eliminate

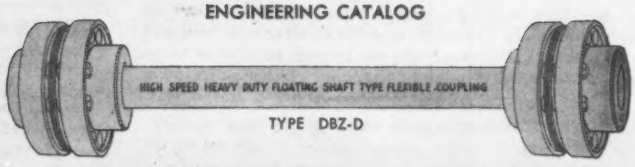
BACKLASH, FRICTION, WEAR AND CROSS-PULL

.....the 4 destructive evils found in all other types and makes of couplings.

NO BACKLASH
NO WEAR
NO LUBRICATION
NO THRUST
FREE END FLOAT

These are the five essential features of Thomas Flexible Couplings that insure a permanent care-free installation.

WRITE FOR COMPLETE ENGINEERING CATALOG



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THE THOMAS PRINCIPLE ELIMINATES CHAINS, SPUR GEARS and other VIBRATING MAKESHIFTS

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

obscured by the unfortunate acoustics of the room and the distant rumble of thunder.

Concluding the exercises, Lieut. Gen. L. G. Rudenko, famed commander of the Stalingrad air defenses, accepted the power unit on behalf of the Soviet. Agile Gen. Rudenko attained the speaker's platform by an energetic leap and in excellent voice, delivered his country's acceptance in animated Russian. An aide to the general interpreted the speech in equally animated English to the audience, which by then was huddled around the speaker's platform.

According to an inspector, the mobile power plant is capable of serving a community of more than 25,000 persons with adequate electric power. Operation of the train is comparably simple. A locomotive pulls the unit to a selected site where it is "spotted" on a single track. Steam pipes, water pipes and electric cables, which are all carried on the train, are connected by a small crew and the train is in operation.

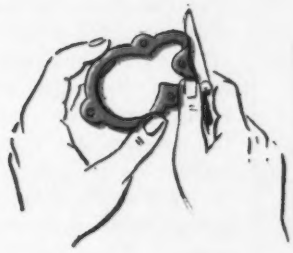
Although no official figures were available, a guest engineer estimated the cost of the unit to be more than $500,000, making the entire contract worth about $20,000,000. An acf man said that despite their troubles with labor, production was only a few days behind schedule.

Immediately following the presentation ceremony, the guests were driven to the Berwick Golf Club for luncheon. During the afternoon, guests played golf, bridge or listened to a concert on the lawn rendered by the American Car & Foundry band. Occasionally, a triumphant yelp from the back porch would announce that someone had won in a fascinating American game of skill. Gen. Rudenko, chairman of the Russian Purchasing Commission, functioned in this field of endeavor with an enthusiasm almost comparable with his defense of Stalingrad.

At dinner, officials of the General Electric Co. and the acf explained some of the engineering and construction problems posed in the production of the mobile power plant. In order to test the unit with a low grade coal or one that more nearly approached Russian fuel, western coal was used. This low grade fuel cost $1.60 a ton. The freight cost to Berwick amounted to $16.00 a ton. However, even this low grade coal brought sufficient heat to raise the power output to the required 3000 kw. Transportation difficulties prevented import of coal from Russia.

How to save *operations* in assembly...

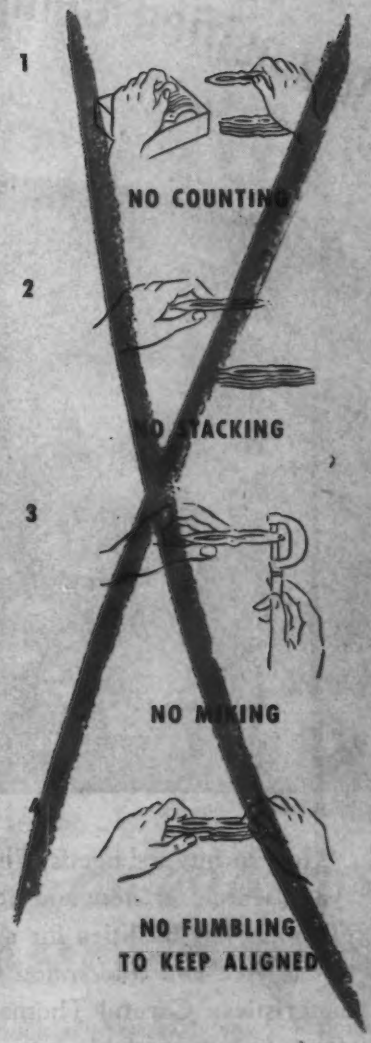
1



Simply peeling *precision laminations from a Laminum shim leaves a solidly bonded unit... of known gauge... provides exacting accuracy of adjustment.*

2

Position shim and tighten the bearing. It is as simple as that.



it's **LAMINUM**

THE SOLID SHIM THAT *peels* FOR ADJUSTMENT

IS YOUR ASSEMBLY department still using loose-leaf shims?...counting...stacking...miking...and spending time fussing to keep loose paper-thin shims aligned while bearings are fitted? *If so, there are assembly-cost savings ahead for you.*

New users of Laminum are being added continuously...and equipment makers who have installed these shims for 25 years and more continue to *use Laminum as new models are brought out.*

One aircraft engine builder, using Laminum to secure proper back-lash of gears, adjustment of anti-friction bearings and in many other applications, has used these shims ever since their first engine was built 15 years ago.

Try Laminum shims. Resulting assembly savings may be of even greater value to you in post war production. (If you want an idea of the hundreds of present applications of Laminum, write for our photo file-chart.)

Shims cut to your specifications. Stock shim materials for maintenance are carried by industrial distributors.

LAMINATED SHIM COMPANY, INCORPORATED
63 Union Street • Glenbrook, Conn.

2142

Alert to buyers' needs, Thomas will gladly assist you in your search for new and better ways to do things. Since Thomas has facilities for a wide range of mill practices, it can give you cold rolled strip steel with unusual characteristics. Careful Thomas production provides a uniform and dependable raw material with which to work . . . with it you can speed your production to meet intensified quality competition now and in the future.

Thomas Strip
COLD ROLLED STRIP STEEL

BRIGHT FINISH NOT COATED, SOLDER COATED, ELECTRO-COATED WITH NICKEL, ZINC, COPPER, BRASS, AND LACQUER COATED—IN COLORS

THE THOMAS STEEL CO. • WARREN, OHIO
SPECIALIZED PRODUCERS OF COLD ROLLED STRIP STEEL

Conservations to the Value of $225,989,778 Made by Government

Washington

• • • **Through salvage,** rebuilding of used equipment, simplification or curtailment of projects, substitution of critical materials, re-allocation of supplies, and other realinements the Bureau of Yards and Docks effected conservations to the value of $225,989,778 in 1943, reports Vice Admiral Ben Moreell, Civil Engineer Corps, U. S. N., the bureau chief.

Vice Admiral Moreell pointed out that the conservations did not represent an actual cash balance at the end of the year, but that the bureau was enabled to reduce its supplementary budget requests by approximately this amount by its program.

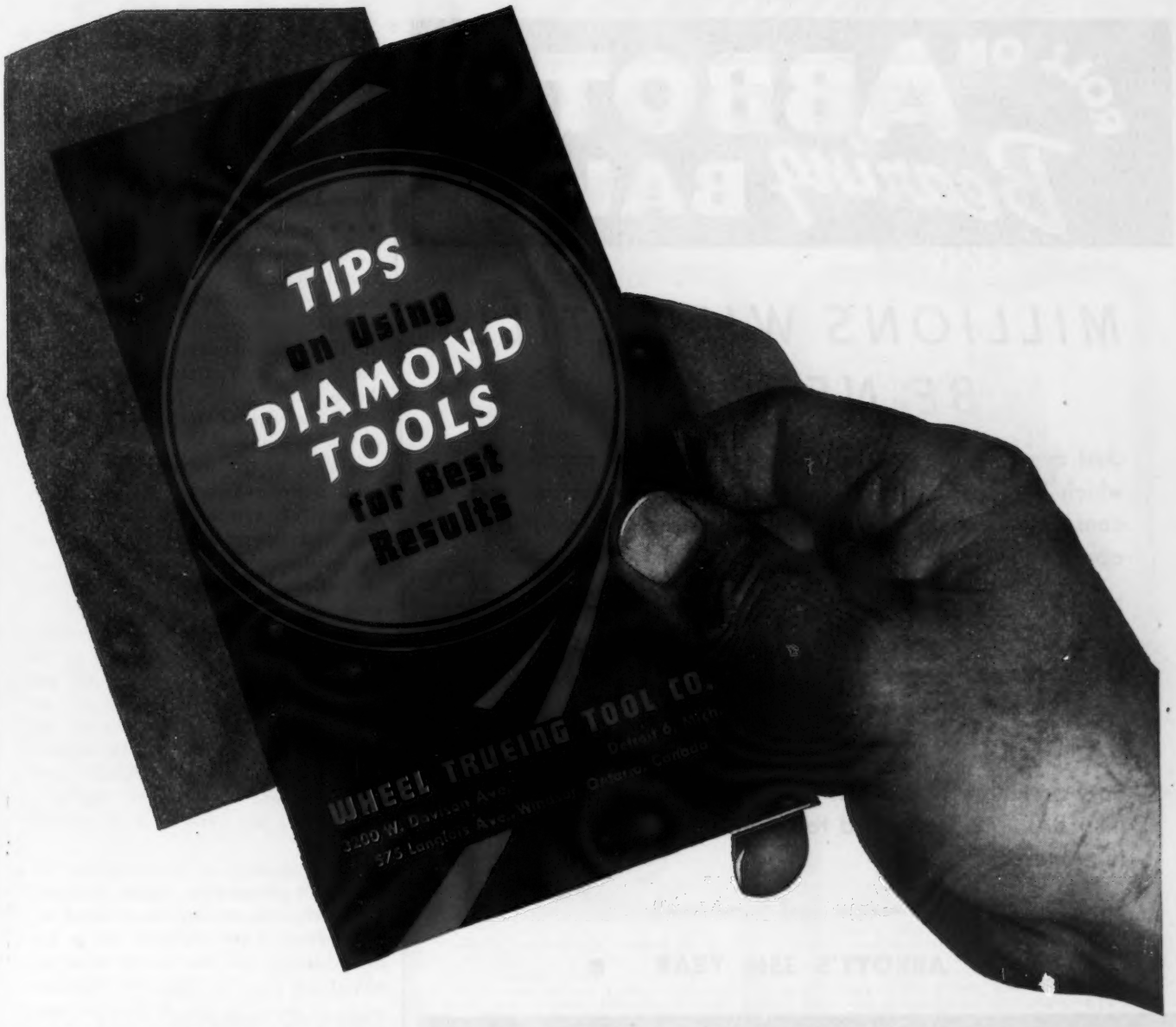
Other opportunities for conservation were: The elimination of all new construction projects which do not make a direct and important contribution to the conduct of the war and which cannot be demonstrated to be essential for that purpose.

The simplification, curtailment, or suspension of any construction project which is already under way and which does not have a direct bearing on the war effort. This applies even though the materials for the project may be entirely fabricated and on hand.

The elimination of unnecessary refinements from work under way and the final acceptance of such work without requiring that high degree of polish which was formerly insisted upon before the contractor was released of further responsibility under the contract.

Reduction of all maintenance operations to the minimum essential to keep the equipment in safe operating condition, thus releasing manpower as well as conserving materials. The vigorous collection of scrap, particularly metals, even if such collection is uneconomical from a monetary standpoint. In July, 1943, Surplus Material Boards were organized for the more rapid disposition of equipment and excess materials. Equipment and materials were transferred to other Navy locations and to other governmental agencies during 1943 amounting to a total of $100,026,610.

Month by month, considerable savings have been effected under the Controlled Materials plan by the elimination of the more critical war materials.



THIS FREE BOOKLET FOR YOUR OPERATORS WILL SAVE YOU MONEY ON DIAMOND TOOLS

Every day, in plants all over the country, time is lost, production is reduced and the quality of grinding is lowered because of inexperience in the use of diamond tools.

The diamond tools themselves also suffer through misuse and so do the grinding wheels upon which they are used.

This condition is the natural result of wartime expansion and the unavoidable necessity of using inexperienced operators, without having the opportunity to train them properly.

In order to remedy this condition, Wheel Trueing has prepared the booklet shown above. We would like to send you a copy free of charge.

This book tells why grinding wheels need dressing and when and how they should be dressed. It describes and illustrates the correct method for setting up and using the diamond tool. It discusses common defects in dressing technique and shows the results on the actual work. It tells how to avoid misuse and abuse of valuable diamond tools, how to avoid excessive resetting cost, how to get more work from these tools through proper use.

Write for your free copy TODAY.

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Avenue
Detroit 6, Michigan

FACTORIES

575 Langlois Avenue
Windsor, Ont., Canada

ROLL ON ABBOTT Bearing BALLS

MILLIONS WILL STILL BE NEEDED!

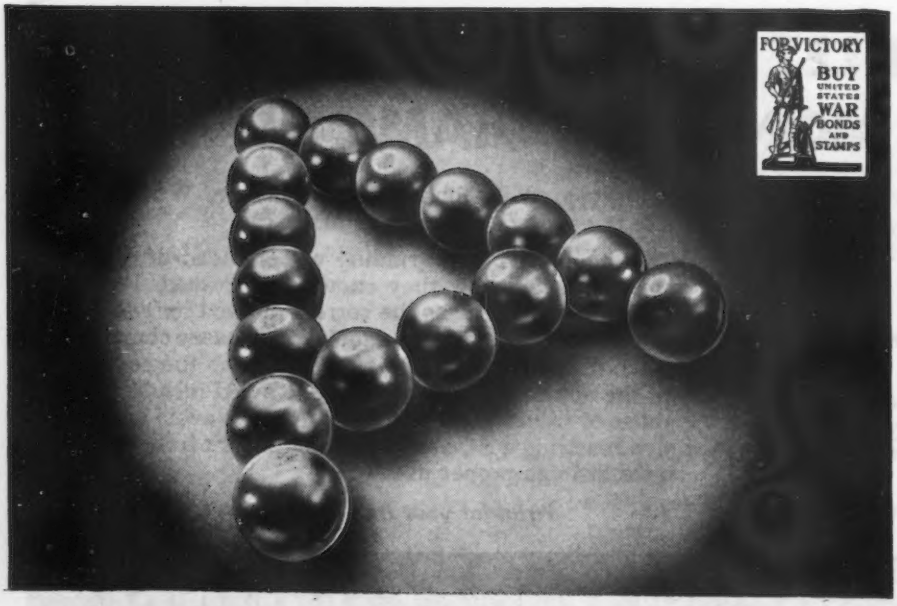
Just over the horizon is a pent-up demand for products in which BEARING BALLS will be needed — industrial and consumer products—new mechanisms—as well as familiar applications.

Each day brings that much nearer the time when BEARING BALLS will be the deciding factor in the success of some assembly as yet unavailable because of the pressure of immediate war-time requirements.

Whether the problem involves extreme precision or heavy duty stamina, ABBOTT has the answer in a grade of BEARING BALL manufactured to exacting standards of structure and accuracy.

Specify "ABBOTT"—now and tomorrow!

● ABBOTT'S 35th YEAR ●



ROLL ON ABBOTT Bearing BALLS
THE ABBOTT BALL COMPANY HARTFORD, CONN. U.S.A.

Draft Boards Advised On Re-employment of Veterans Procedure

New York

• • • **In a memorandum** issued for the guidance of local draft boards, National Selective Service headquarters recently set forth the policies and principles covering the administration of the re-employment provisions of the Selective Training and Service Act of 1940.

Each section of the act as it applies to the re-employment of veterans was analyzed in the memorandum which dealt with problems affecting qualifications of veterans for re-instatement. Answers to questions concerning seniority rights and duties and obligations of employers under the act were also outlined in detail.

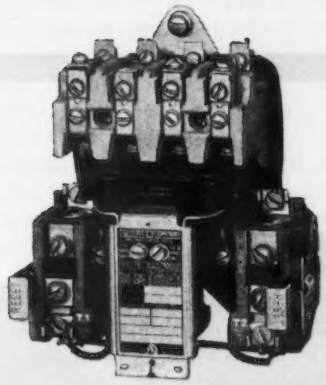
Among the highlights of the memorandum, clarification in regard to the returning veteran's status in his old job was stated as follows: "A veteran is entitled to re-instatement in his former position or one of like seniority, status and pay, even though such re-instatement necessitates the discharge of a non-veteran with greater seniority."

Other interesting explanations include: "1—Seniority rights accumulate during the veteran's period of active service in the armed forces in the same manner as they would have accumulated had he remained continuously at work in his civilian occupation. 2—A veteran, in order to claim re-instatement in a position, must be qualified to perform the duties and functions of that position. If unable to qualify for an up-graded job, he is, nevertheless, entitled to a position equal in seniority, status and pay to the one which he left. 3—In the case of jobs created by war expansion, the 'permanent' or 'temporary' character of the job likewise depends upon the facts and circumstances in each individual case."

In line with the government's policy to provide for the returning serviceman, five specific training opportunities became available to discharged veterans of this war through the War Manpower Commission. Paul V. McNutt, chairman, announced the availability of the following training services: 1—WMC Apprentice Training Service. 2—Engineering, Science and Management War Training Program. 3—Food War Training Program. (This service is directed towards training farmers to greater produc-

SQUARE D *Announces*

A NEW OVERLOAD RELAY



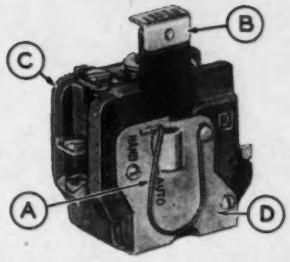
FOR SEPARATE MOUNTING— OR FRONT MOUNTING ON SIZE 0 AND 1 STARTERS

New Type AR Overload Relays provide an easy yet positive method of changing from automatic to hand reset. Adjustability of the tripping point affords greater accuracy of overload protection and flexibility of application. Terminals are large and easily accessible.

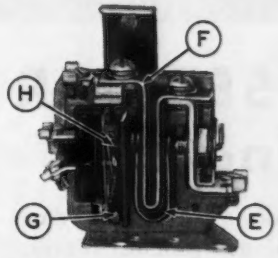
Automatic reset overload relays are useful whenever starters are mounted in remote or inaccessible locations. They are particularly well suited for built-in machine tool control because they eliminate costly external reset mechanisms. No extra charge is made for these automatic reset devices on starters or machine tool control panels.

For complete details call in your Square D Field Engineer or write for Bulletin 201. Industrial Controller Division, 4041 N. Richards Street, Milwaukee 12, Wisconsin.

AUTOMATIC RESET

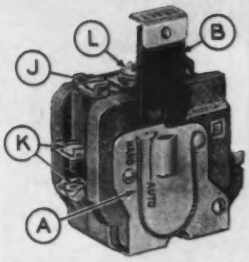


With spring wire clip (A) in hole marked "Auto" and reset slider (B) depressed, relay is in automatic reset position. Insulation blocks (C) are cold molded non-carbonizing material, wax impregnated to prevent absorption of moisture. Steel reinforcing plate (D) protects against breakage and serves as front mounting bracket.

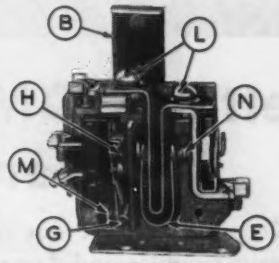


Floating bimetal trip element (E) is "U" shaped to fit around heater (F). This unusual design automatically compensates for any slight variation in shape or location of heater. Change in ambient temperature has little effect on the high temperature bimetal. With cam (G) in ◀ position, contacts will automatically reset after bimetal cools and releases tripping pin (H).

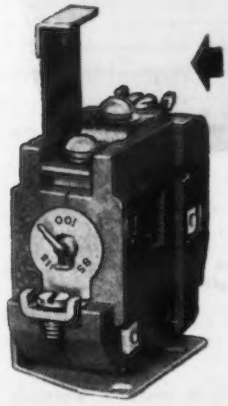
OR HAND RESET



Moving spring wire clip (A) to hole marked "Hand" releases reset slider (B) and provides hand reset operation. Note husky size of load terminal (J) and control terminals (K). Heater units are firmly attached by screws (L) but are easily installed or removed from the front even after starter is mounted and wired.

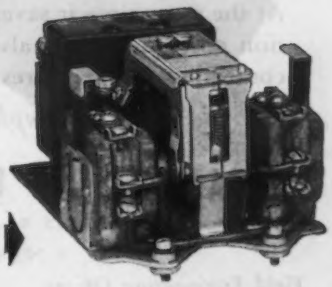


With cam (G) in ▶ position, the contact mechanism goes overcenter when trip pin (H) is pushed as bimetal (E) expands with heat. Silver contact tips at (M) remain open until operation of reset slider (B) turns cam (G) to ◀. Mechanism is trip-free, thus the snap action contacts cannot be held closed against an overload. Note screw (N) which serves as stop for bimetal, also providing adjustment.



Simple means for adjustment of the trip point from 85% to 115% of nominal rating is a valuable and unique feature of this new Type AR overload relay. It permits changes in setting to take care of variations in ambient temperature or load conditions at the motor. In addition, overload protection is not limited to the usual selection of heater sizes since intermediate points can be obtained, easily and quickly.

Type AR relays are designed for maximum accessibility and ease of wiring. Photograph of starter shows how load terminals are out in front for easy wiring, while control terminals are at bottom, away from other parts. Thus, it is very easy to connect overload relays of several starters in series, or to wire additional relays in the circuit. Likewise, it is easy to convert a standard starter to 2 wire separate control.



ELECTRICAL EQUIPMENT • KOLLSMAN AIRCRAFT INSTRUMENTS

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

tion.) 4—WMC Training Within Industry Service. 5—Vocational Training for War Production Workers Program.

Mr. McNutt pointed out that more than 12,000,000 workers have already been trained under these programs and that these services together with other facilities during the postwar period will be even more extensive when they operate to train and rehabilitate the discharged veterans.

A similar scheme for the resettlement of servicemen after demobilization is being developed today in Great Britain, according to *Iron & Coal Trade Review*, a British trade journal.

The British plan will apply to men and women released from the Armed Forces, Merchant Navy, Civil Defense Services, National Fire Service, Police Auxiliaries and Civil Nursing Reserve, and to persons whose war service has been on other types of work of national importance, including industrial work.

In administering the scheme, special care will be given to insure that men and women who have served in

Better COMPRESSED AIR After-Cooling

● Keeping moisture out of compressed air is the best way to prevent troubles and damage to pneumatic equipment. Water, condensing in the air lines, wears out and rusts out the vital parts of compressed air tools as well as freezing up air lines and delaying production. In many industrial uses excess moisture or oil in compressed air is also damaging to other materials or products.

The best way to halt such troubles is to use a NIAGARA Aero AFTER COOLER with your air compressor. By evaporative cooling, using atmospheric air as the cooling medium, it obtains lower temperatures and produces compressed air containing only 1/2 to 3/4 as much moisture as air cooled by conventional methods. At the same time it saves cooling water costs, repays its installation cost quickly. It also provides compressor jacket water at controlled temperatures.

For complete information, write to

NIAGARA BLOWER COMPANY

"25 Years of Service in Air Engineering"

NEW YORK Address: Dept. IA-64
6 E. 45th Street,
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Field Engineering Offices
in Principal Cities

NIAGARA

INDUSTRIAL COOLING • HEATING • DRYING
HUMIDIFYING • AIR ENGINEERING EQUIPMENT

Post-War Planning Questionnaire by Worthington

Name: _____

Age: _____

Home Address: _____

Date You Entered Service _____

What general or special training have you received since entering military service?

(Describe in detail)

_____

_____

_____

_____

_____

What are your present duties, responsibilities, etc. _____

_____

_____

_____

What do you think you would be best suited for (after the war)?

_____

_____

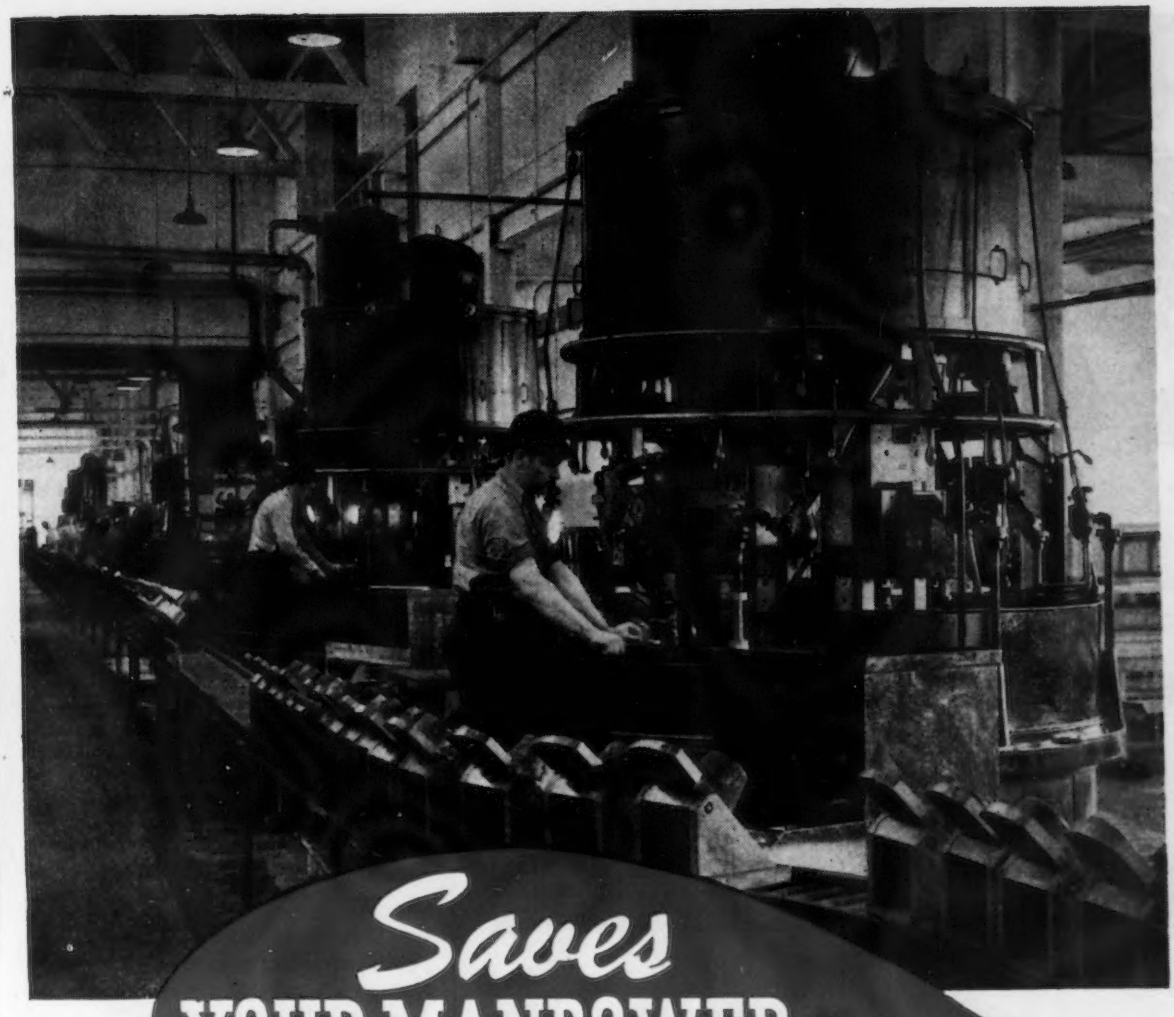
_____

Do you desire to return to Worthington?

_____

_____

DO NOT WRITE IN THIS SPACE



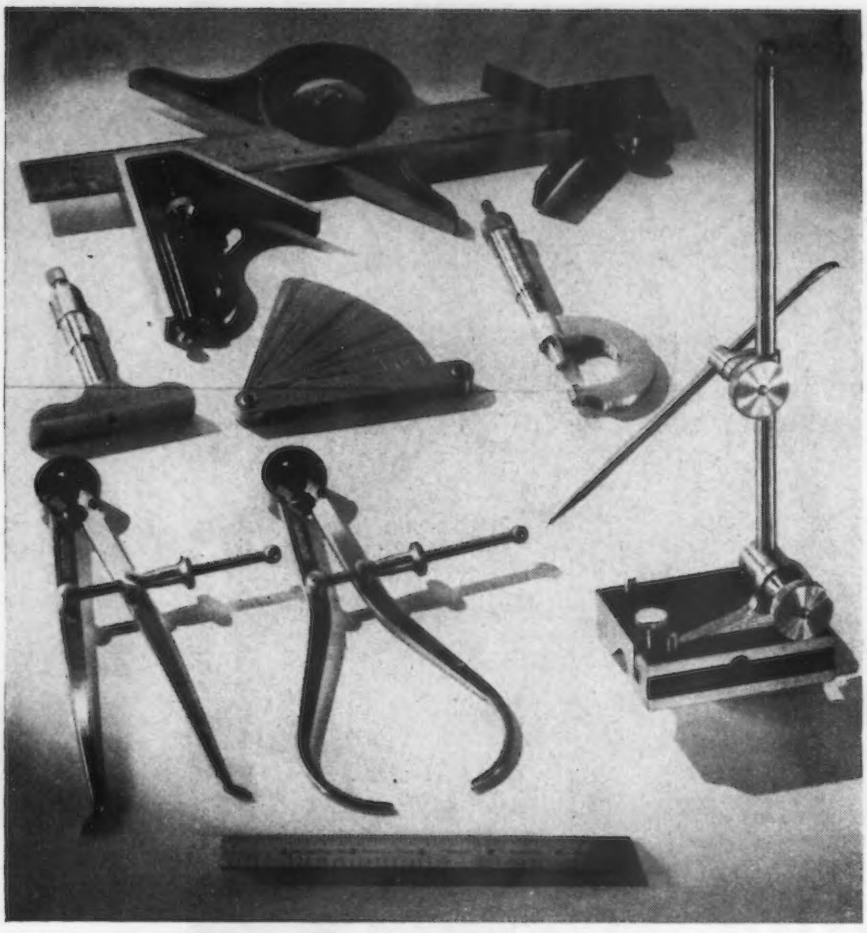
Saves YOUR MANPOWER...

On these two Bullard Mult-Au-Matics two men are doing the work which by other methods would require sixteen. That means fourteen men who can be used in other ways to aid the war effort.

The machine is so constructed as to guard against accidents. Its operating principles assure you that an operator's work-ability is nearly as high at the end of his shift as when he started. Furthermore, since the machine and tools are definitely set for the job, work is produced accurately over long periods of time by even unskilled operators. It is more important now than ever before to guard your operator's work-ability because of the present manpower shortage.

These benefits are no less important to you than the high productivity and extreme precision of Mult-Au-Matic output. And they will be equally to your advantage after the war is won.

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT



Victory is spelled

P-R-E-C-I-S-I-O-N

The difference between victory and defeat is often measured in 10,000ths of an inch. The weapons that stand up in combat are the ones that are held within the designers' tolerance limits.

Making sure that the weapons are right is a job that has been increasingly assigned to Millers Falls Precision Tools. Hundreds of thousands of these fine instruments are at work in the arsenals of Democracy today.

After Victory, Millers Falls Precision Tools will enjoy continued acceptance of the American metalworking industry. They have proved themselves worthy representatives of the famed Millers Falls line.

The picture shows a few of the precision tools in the Millers Falls wartime line. Details are available upon request.

Calipers and Dividers • Feeler Gages • Surface Gages • Micrometers
Depth Gages • Combination Sets
Steel Rules • Center Gages • Screw Pitch Gages

MILLERS FALLS TOOLS
SINCE 1868

MILLERS FALLS COMPANY
GREENFIELD, MASS., U.S.A.

the Armed Forces and are eligible for training under the scheme receive their training as early as possible after release from the colors, and, if at any time the facilities for training are insufficient to meet the needs of all applicants without delay, men and women released from the forces will be admitted first.

Training in England will be given in government "Training Centers" and administered by the Ministry of Labor and National Service. Detailed application of the training program to the different industries will be developed in consultation with representative organizations of employers.

On the home front in private industry, considerable research and planning are underway for the hehabilitation of war veterans. Evidence of this forethought and planning was published recently in the Worthington Harrison Works *News*.

Other plans for the rehabilitation and re-employment of veterans have been described in THE IRON AGE. *These appeared in the issues of: Jan.* 13, *page* 78; *Feb.* 24, *page* 105; *March* 9, *page* 108; *March* 23, *page* 100; *April* 6, *page* 104; *and May* 25, *page* 110.

The Worthington Harrison Works has prepared and plans to send to each of their men in the armed services a questionnaire on the subject of the employee's intention to return to the company. According to the *News*, "the purpose of this being to determine just who intends to return to Worthington, and to enable us to be better prepared to utilize any new skill acquired during their service.

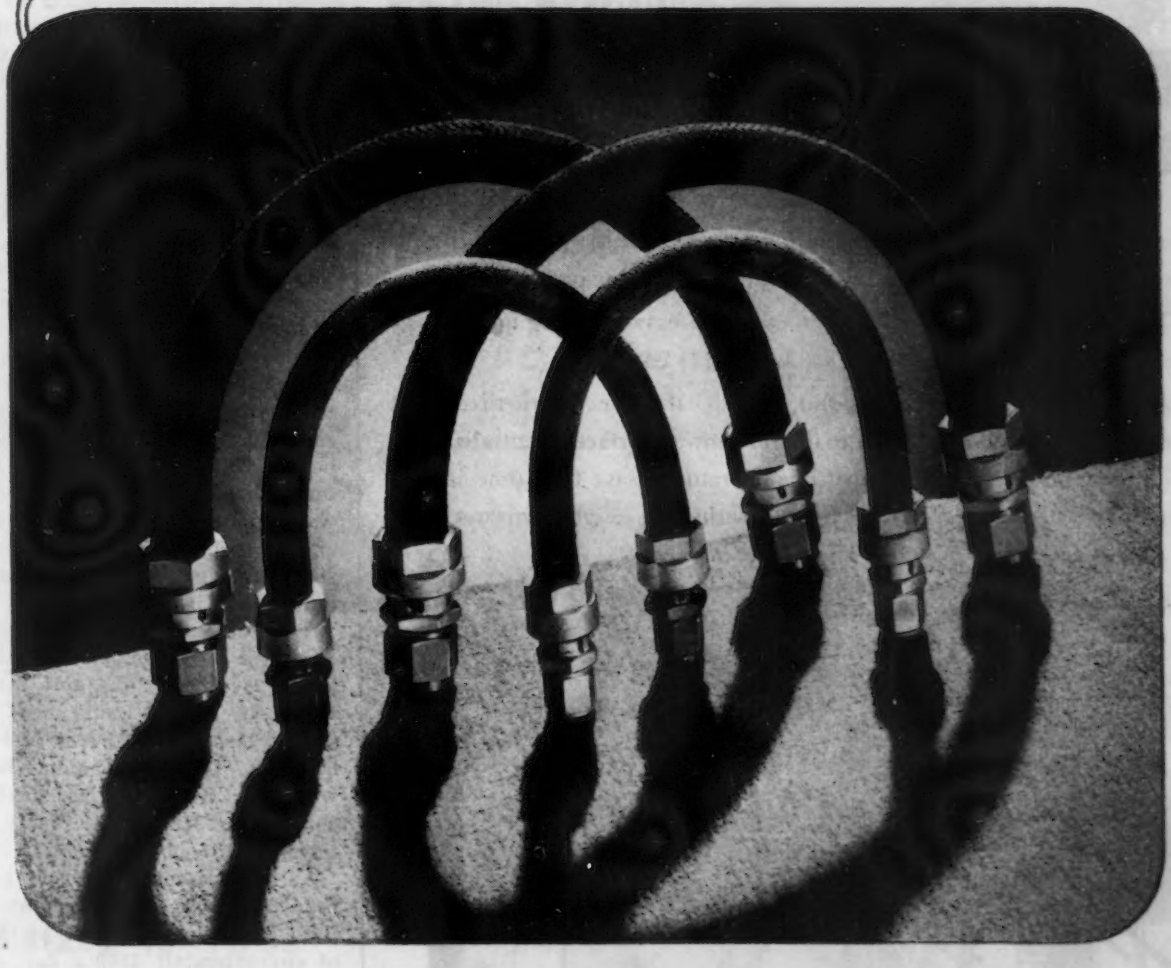
"One of the greatest things that has happened to the men who have left here has been the training, education and experience they have received in the various divisions of the armed forces since they left us and which they will bring back on their return.

"In addition to the veterans who have served in the armed forces, we are also giving the highest consideration and thought to the veterans of Worthington Harrison Works who have served during the stress of the war years. It is our sincere hope and desire to assure a continuity of employment to all our people, and it is entirely possible that a better job can be found for many in the postwar period through the survey being made."

Life lines OF MACHINES AND MEN!

This is a good picture of four strands of FLEXIBLE HOSE—but no picture at all of their dramatic part in modern warfare. It would take moving pictures to tell *that* story! You'd see water, fuel and oil rushing through them at the height of battle . . . in planes, tanks, ships and combat cars in every sphere of combat.

Truly the wartime function of simple flexible hosing is equalled only by its peacetime potentialities. As the world's largest manufacturers of this product, the four plants of The Weatherhead Company have played a prominent part in the nation's war effort—and are prepared to assume the same role in Peace.



Look Ahead with

Weatherhead

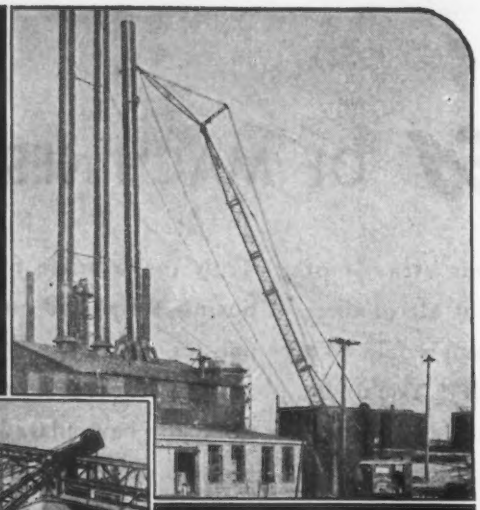
THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

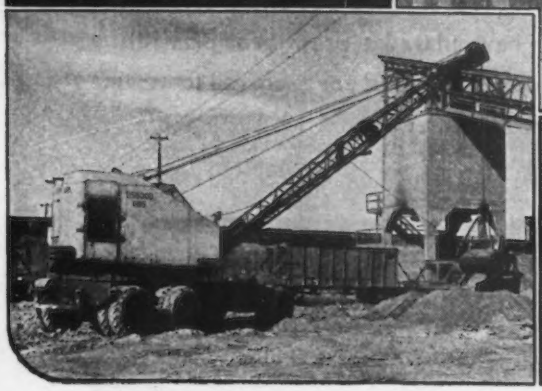
Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.

Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada—St. Thomas, Ontario

FREE: *Write on company letterhead for "Seeds Of Industry"—a history of The Weatherhead Company, its many facilities and diversified products.*

HEAVY HUSTLING
is routine----





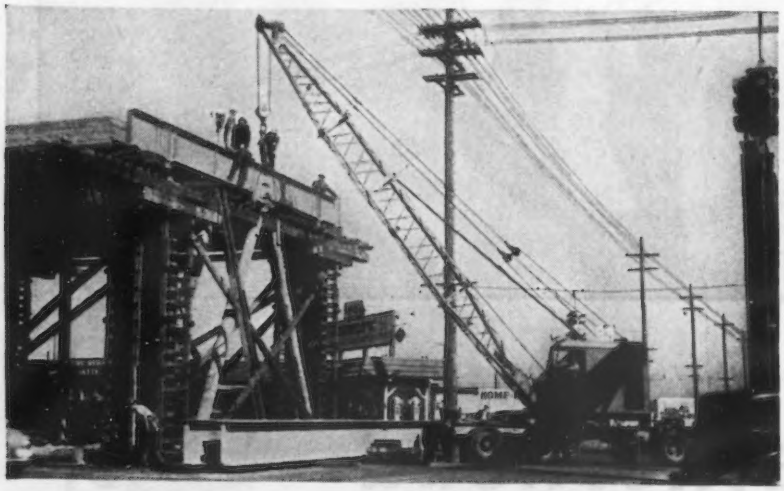
FOR
MOBILCRANES
AND
SUPERCRANES

For the heavy-duty materials handling jobs around the plant, docks, yards or warehouse, roll out a rubber-tired Mobilcrane or Supercrane.

There's the power, the mobility, the kind of easy-handling qualities that the guy at the levers likes . . . and makes count.

And from an efficiency standpoint, consider this: pneumatic tires to eliminate shock and damage to road and runway surfaces; centralized one-engine power in the hands of one operator to save fuel, time and man-hours; design and construction to withstand tough punishment *. . . all at lower cost per unit of material moved.*

Remember those facts tomorrow!



ONE MAN • ONE ENGINE • ON RUBBER

THE OSGOOD CO.
MARION, OHIO
MOBILCRANES

THE GENERAL EXCAVATOR CO.
MARION, OHIO
SUPERCRANES

Auto Industry Can Provide 10,000,000 Jobs, Says Canaday

New York

• • • **The automobile industry** can provide jobs for 10,000,000 persons when the war ends if, in its first year of unrestricted production, it builds the approximately 6,000,000 units which probably will be required over a period of years to bring the nation's motor vehicle supply to its prewar level.

That opinion was expressed here recently by Ward M. Canaday, president of Willys-Overland Motors, who said that the 10,000,000 jobs would be "nearly a fourth as many as all industry ever provided in the country's busiest prewar year." He explained that this figure is based partially on the fact that in 1939 the automobile business—as the "keystone of America's job structure"—was responsible for the employment of approximately 6,700,000 persons while building 3,577,292 passenger cars and trucks.

Mr. Canaday said he believes the greatest job opportunities outside the widely varied production plants will be found in the sales and servicing fields, which have been heavily hit by the war. "It is not improbable," he said, "that this field will employ nearly 2,000,000 persons as against approximately 1,300,000 before the war. Many applicants for these positions will probably be recruited from among demobilized war veterans."

The auto executive pointed out that thousands of other jobs will be created indirectly by the auto manufacturers in a wide number of enterprises, such as the tourist and resort business. The "Jeep" alone, he said, will add a new motorized medium of employment that can supply many thousands of jobs.

At the present time there are less than 24,300,000 cars in operation and these are being scrapped at the rate of approximately 3500 a day, according to the Office of Defense Transportation.

WLB Orders Checkoff

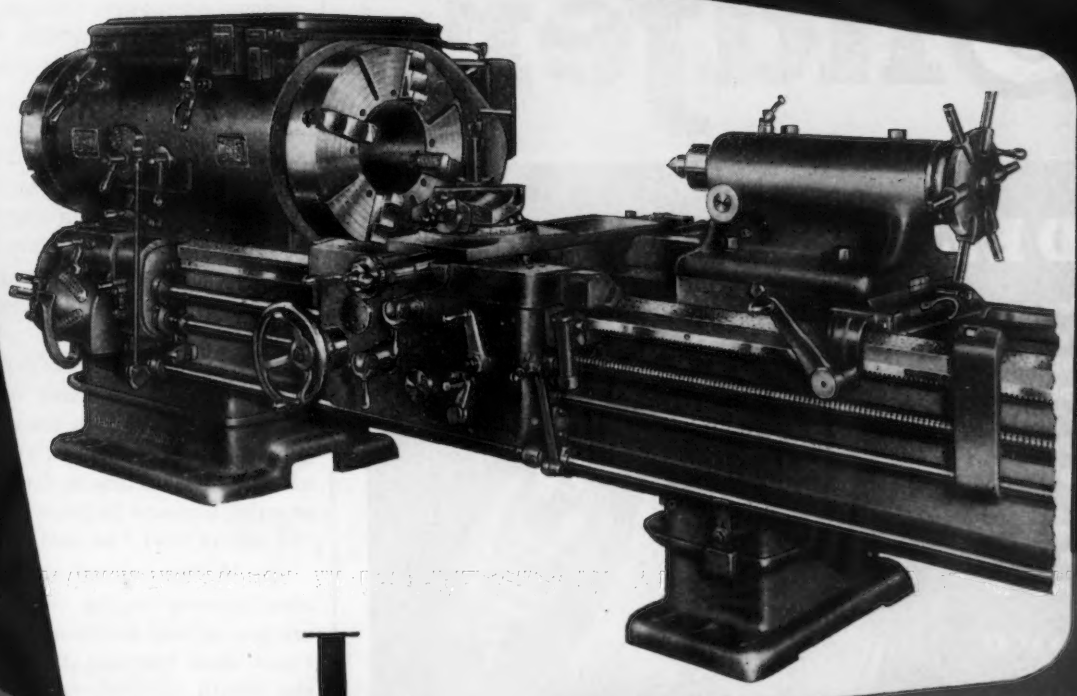
Chicago

• • • **Maintenance of** membership and checkoff of union dues have been ordered by the Sixth Regional War Labor Board, Chicago, in a dispute affecting 1100 workers at Taylor Forge & Pipe Works, Chicago. The union's request for preferential seniority was denied.

For Faster Production, Better Work, Lower Costs—

HYDRATROL LATHES

Large Hollow Spindle Type



30" Heavy Duty Lathe with 13" Hole in Spindle

In a number of big war plants they are performing important operations in 1/2 to 1/7th the time of previous practice!

FIVE SIZES—18" TO 36"

Small . . . . 18" up to 7 1/4" Hole
Medium . . . . 24" up to 12" Hole
Large . . . . . 27" up to 13" Hole
Large . . . . . 30" up to 14" Hole
Large . . . 36" up to 16 1/2" Hole
(Standard type lathes, 16" to 36")

Look around your own plant — you may find a number of machining jobs which are a problem to you — jobs which possibly could be done *better* on a Large Hollow Spindle Type of HYDRATROL LATHE.

Send us prints of these difficult, unusual or too-costly jobs, for a specific, time-and-money-saving recommendation.

18" Lathe with 7 1/8" Hole in Spindle

Lehmann MACHINE COMPANY

CHOUTEAU AT GRAND ★ SAINT LOUIS (3) MISSOURI

Rickert Shafer

FOR 35 YEARS

MODEL "F" Automatic DIE HEAD

1. Compact—few parts.
2. At end of thread cut—head snaps open.
3. Reset automatically, or manually with 1/4 turn of handles.
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Excessive Turnover In Shipyards Aggravates Manpower Problem

Washington

• • • **Excessive labor turnover** among shipyard workers, including those employed in Navy Yards, constitutes a serious manpower problem, Paul V. McNutt, Chairman of the War Manpower Commission, said recently.

Mr. McNutt said reports show that since September 1942 the monthly separation rate has ranged from 8 to 11 per cent of the total shipyard labor force. The problem is aggravated by the fact that employers are generally unable to replace a large proportion of the workers leaving the shipyard industry.

"Although the most urgent requirements for maritime and naval ships are being met at this time, total employment in the shipbuilding industry continues to decline in face of a substantial increase in the work load for the rest of 1944," he said.

Mr. McNutt pointed out that excessive turnover among shipyard workers is a serious problem in the Pacific Coast, New England, the Gulf Coast, the South Atlantic and Wisconsin shipbuilding areas.

"Post-war job attractions, the desire to return home, military separations, and community conditions are some of the prevailing reasons cited for quits in the shipbuilding industry.

Mr. McNutt said that failure of Navy Yard workers to stay on the job is causing much concern. The Navy, he said, is doing a two-fold job—"spearheading the biggest seaborne attack in naval history and maintaining and repairing a greatly enlarged fleet of combatant vessels and auxiliary units."

Some yards have been fully staffed, but are forced to continue to recruit new workers because of labor turnover. Several thousand new workers will have to be recruited by shipyards, including Navy Yards, in the immediate future.

Immediate labor shortages in shipyards are divided between unskilled and skilled workers, including welders, chippers, caulkers, boilermakers, metal workers, machinists, pipefitters, riggers, painters, electricians and helpers.

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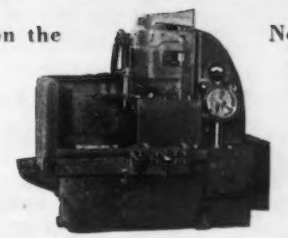

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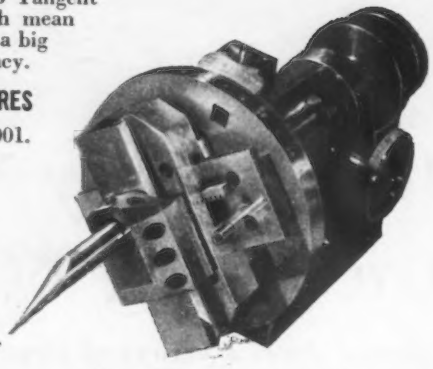

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War Industries Get Greatest Priority On Available Labor

Washington

• • • **Paul V. McNutt,** chairman of the War Manpower Commission, has acted to give industries that are most vital in the nation's war effort priority on all available male labor.

He directed his regional directors to put into effect not later than July 1 a plan designed to aid war industries in which there is now a critical shortage of strong male labor. The order stiffened the voluntary manpower system by extending throughout the nation certain methods locally developed and tested in previous operations.

The four steps that will be taken to carry out the priority referral plan are:

1—Establishment of a nationwide system of priority referrals, after consultation with regional and area committees to the degree necessitated by regional and national manpower demands, which provides that employers shall hire all male workers only from those referred by WMC's United States Employment Service, or by approved arrangements.

2—Setting employment ceilings in the 184 areas of labor shortage as defined by WMC. These are cities listed as Group I and Group II areas. The ceilings fix the total number of men who may be employed in specified establishments.

3—Creation of manpower priorities committees in all of these areas. These committees will decide which industries in their respective areas are entitled to priorities in the referral of available male labor.

4—Intensification of the recruiting activities of USES so that men may be transferred from areas of labor surplus into those areas where urgent war production requires more labor.

•

Questions and Answers Prepared to Clarify Order

Washington

• • • **The following questions** and answers are based on the order of Paul V. McNutt, chairman of the War Manpower Commission, to regional directors to put into effect a priority

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Cross Special Rotary Milling Machine No. 18600—described in detail in the new Cross Catalog

Special metal-working machinery does more than solve production problems. It is often the answer to manpower difficulties, too.

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The result: Anyone can operate the machine. The automatic work cycle leaves the operator free to attend other machines. The whole operation is ideally suited to female labor.

Fast production is everyone's problem—now, and tomorrow. But the Cross idea in designing special machinery is an idea that solves *manpower* problems, too, by creating machines that perform one or more metal-working operations automatically at the push of a button.

There are 35 detailed case histories similar to this one in the new Cross Catalog No. 240. If you have a production problem or a *manpower* problem, the solution may be yours for the asking. Just write The Cross Company, Detroit 7, Michigan, Department 42.

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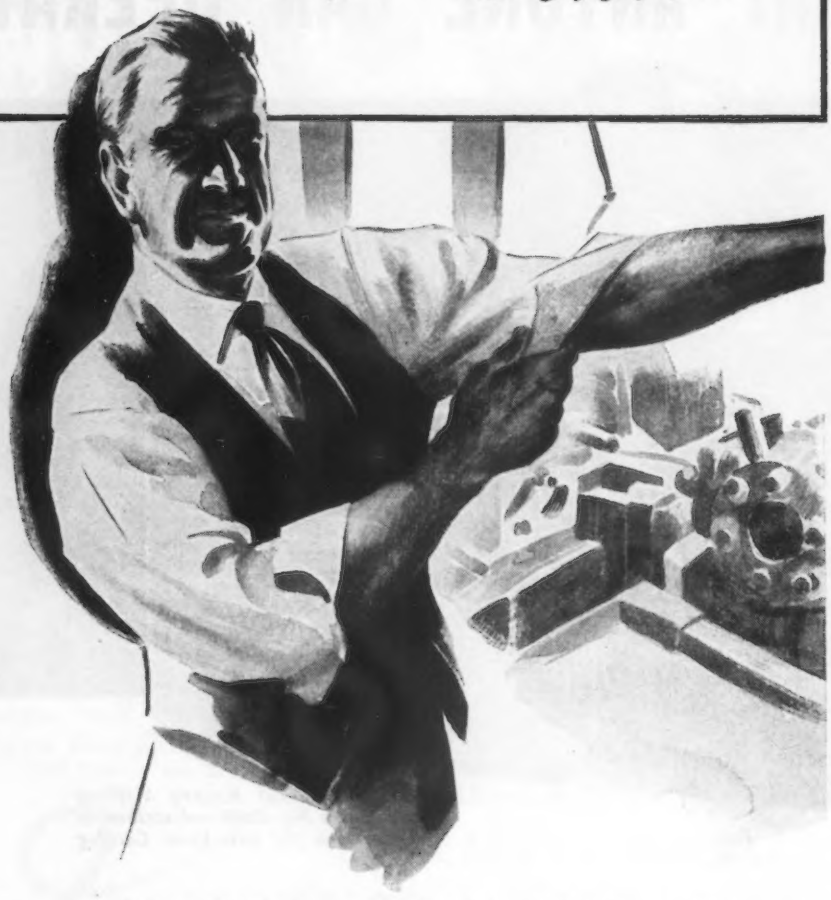

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referral system to give war industries the labor they need:

Q. What is meant by "priority referral?"

A. This is the WMC's definition of priority referral: The channelling of workers to jobs in the order of the urgency of war needs.

Q. Will local conditions be taken into consideration in putting the plan in effect?

A. The system will be applied only after consultation with regional and area committees and then to the degree necessitated by regional and national manpower needs.

Q. When will this new plan go into effect?

A. July 1, 1944, at the latest.

Q. How does the plan work?

A. It provides that employers in any area, except those in agriculture, may hire male workers only from among those referred by the WMC's U. S. Employment Service or in accordance with the arrangements approved by the local USES after consultation with the area management-labor committee. This will result in workers being referred to jobs in the order of relative importance to the war effort.

Q. Is that being done now?

A. Plans for priority referral were tried out, and successfully, some time ago in a few areas where labor shortages had become critical. More than 100 such plans of varying types are now in effect. They have been known as "controlled referral" plans.

Q. Why is this new program needed?

A. Crucial war production plants in many sections of the country are finding difficulty in getting and holding the able-bodied male labor needed to meet their schedules. Outstanding among these are the foundries and forge shops, rubber and tire factories, ship repair, logging and lumbering. To a lesser degree coal operators, manufacturers of textiles and electronic equipment are also experiencing labor shortages.

Q. This plan has the effect of bringing about a better apportionment of labor—is that it?

A. Yes, a better allocation of labor. To get our working forces out of the back areas—areas where there is little war production and a surplus of labor—to plants where they are vitally needed. This is just as necessary as it is to get our fighting forces to battlefronts. That is what the operation of the priorities referral system is expected to accomplish.

Q. What assurance is there the new

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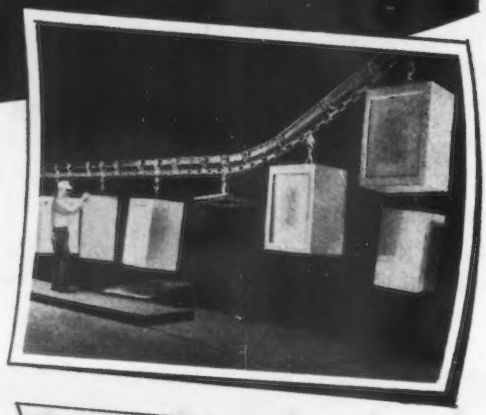

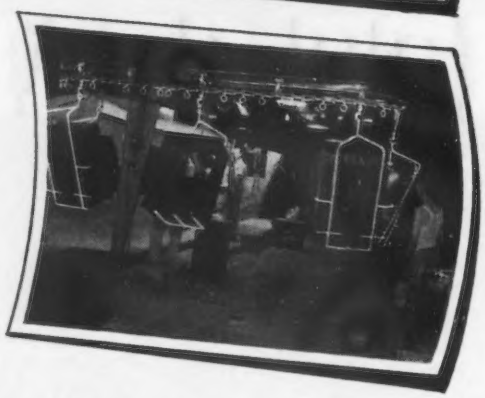

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plan will work?

A. It will be backed by three tested programs: (1) Employment ceilings that fix the total number of workers who may be employed in any given establishment in areas of labor shortage as defined by the WMC; (2) setting up manpower priorities committees in all labor shortage areas; (3) stepped-up recruitment activities by the USES so that men may be transferred from labor surplus areas to those where there is an urgent need for more male labor.

Q. In how many areas are these programs now being used?

A. Manpower priorities committees have been set up in 56 areas. Employment ceilings are in effect in 31.

Q. What does a manpower priorities committee do?

A. This committee determines on the basis of production demands which employers within the area shall have the first call for labor. They also work with the area director in setting up employment ceilings.

Q. Who are the members of manpower priorities committees?

A. There is some variation in membership but on all committees there are representatives of the WMC, the War and Navy Departments, WPB, Selective Service, Maritime Commission, SWPC, Aircraft Resources Control Office, WFA, ODT when there are transportation problems and civil service if government employment is an important factor.

Q. What do you mean by "employment ceiling?"

A. An employment ceiling is the highest level of total employment or of specified types of employees which an establishment is not permitted to exceed, based upon an approved and necessary production schedule.

Q. Do ceilings for all employers in an area follow the same pattern?

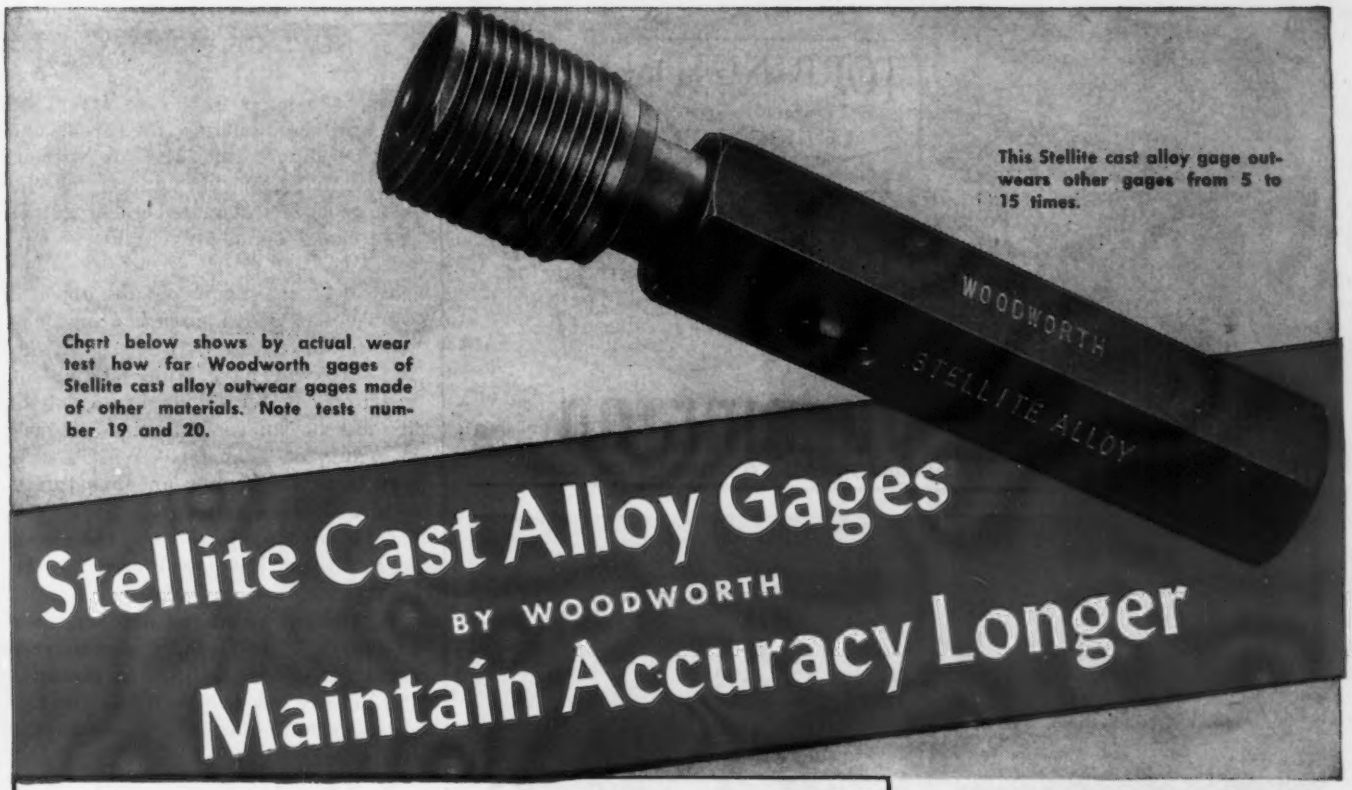
A. Ceilings may be established to maintain employment at present levels; to permit employment expansion, or even to lower the employment level where practical. Those already in effect are of varying types. Some apply to all workers, some only to men, and some only to workers in certain industries.

Q. Under this new program will ceilings be fixed throughout the country?

A. Ceilings will be fixed in the 184 labor shortage areas designated as Groups I and II in WMC listings.

Q. Will a man ever be referred to other than an essential job?

A. Only when: (1) He is not needed for any essential job in the

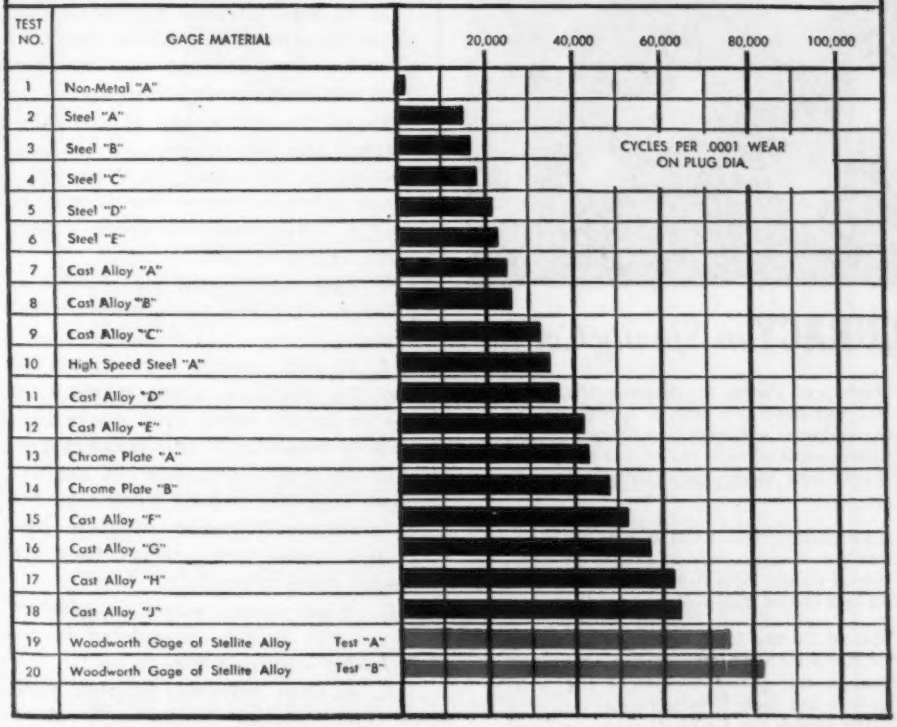


This Stellite cast alloy gage outwears other gages from 5 to 15 times.

Chart below shows by actual wear test how far Woodworth gages of Stellite cast alloy outwear gages made of other materials. Note tests number 19 and 20.

Stellite Cast Alloy Gages BY WOODWORTH Maintain Accuracy Longer

AVERAGE RESULTS ON WEAR TESTS OF VARIOUS GAGE MATERIALS



To test this gage, Woodworth engineers used a specially built wear-test machine — subjecting it to punishment far more severe than in any actual gaging operation. The results of these tests show how effectively Stellite alloy resists abrasion.

It was this and other important characteristics of this metal that led Woodworth engineers to develop the new, tough cast alloy gage which Woodworth offers to manufacturers today — after months of expert research into processing methods.

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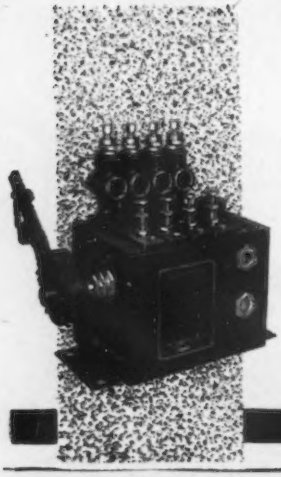

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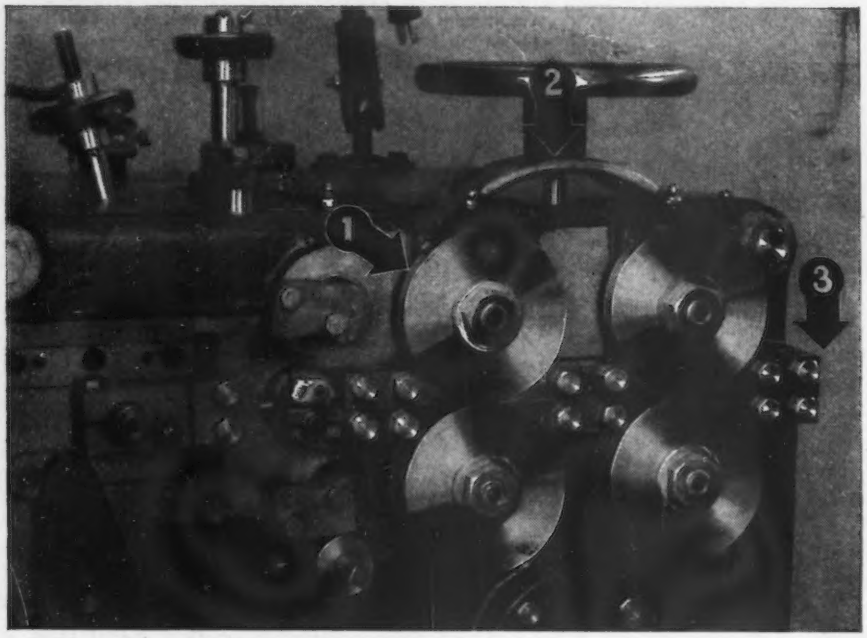

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No. 4 Spring Length

When spring tolerances get down to thousandths, it is vitally important that you have the best in spring coiling equipment. Of course we mean a *Torrington* Spring Coiler. Once you have it, a minimum of care maintains the precision built into it. These tips about maintaining accurate wire feed may help:

1. Feed Rolls must run absolutely true. Runout will cause unequal pressure on the wire. Runout may be caused by wear, or by a small bit of metal on the feed roll shaft, in the feed roll bore, or on either end of the feed roll space collar.

2. Feed roll pressure should be the least necessary to assure positive movement of the wire without slippage. Excessive pressure tends to change the characteristics of the wire. When small or soft wires are used it is advisable to use a light compression spring under the feed roll pressure hand wheel, affording greater flexibility of adjustment.

3. A wire straightener of Torrington's 2-plane, ball bearing type is often of great help, though it must be used with caution. The minimum bending necessary to straighten the wire is the ideal condition. Excessive bending drags on the wire and tends toward use of excessive feed roll pressure.

July 20th—More about *Spring Length*

THE TORRINGTON
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area; (2) he is unable to accept an essential job outside the area, and (3) he cannot take the job without undue hardship or unless special emergency circumstances or other good cause would prevent his acceptance.

Q. Will the employer be given a freedom of choice in accepting men sent to him by the USES?

A. He will have wide latitude of selection. After all he has a job to do and he knows the kind of men he wants on that job. WMC's concern is to see he has an opportunity to hire the men he wants.

Q. What happens if the man doesn't want the job offered by the USES?

A. He will be offered another, then another and still others successively for which he is qualified in essential and locally needed activities in the order of the relative urgency to the war effort.

Q. Will there be any limit to the number of jobs that will be offered to a man?

A. In some areas it may be decided to put in a priority referral plan that provides for limiting the number. This will be determined largely on the basis of the stringency of the labor market and the urgency of the production in the area. In some areas where labor is very scarce it may be that a worker may be given a very small choice of jobs.

Q. Just what is the significance of placing this on a "nation-wide" basis?

A. It will enable recruitment of men for work in areas where they live or in any other area where they may be needed. It will make it possible to refer men now in surplus labor area where their work may not be aiding in the war effort to jobs in tight labor areas where they are needed more urgently.

Q. What other factors in addition to priority will be considered in referring a man to a job?

A. Normal referral policies, such as those relating to the referral of workers at their highest recognized skills to jobs at rates of pay reasonably consistent with prior earnings, will be followed.

Q. Is a statement of availability still required?

A. Yes.

Q. Can the plan be called a device to get workers for war industries continuously menaced by labor shortages?

A. Not only that. It will, WMC believes, be effective in keeping men on the job. This is particularly im-

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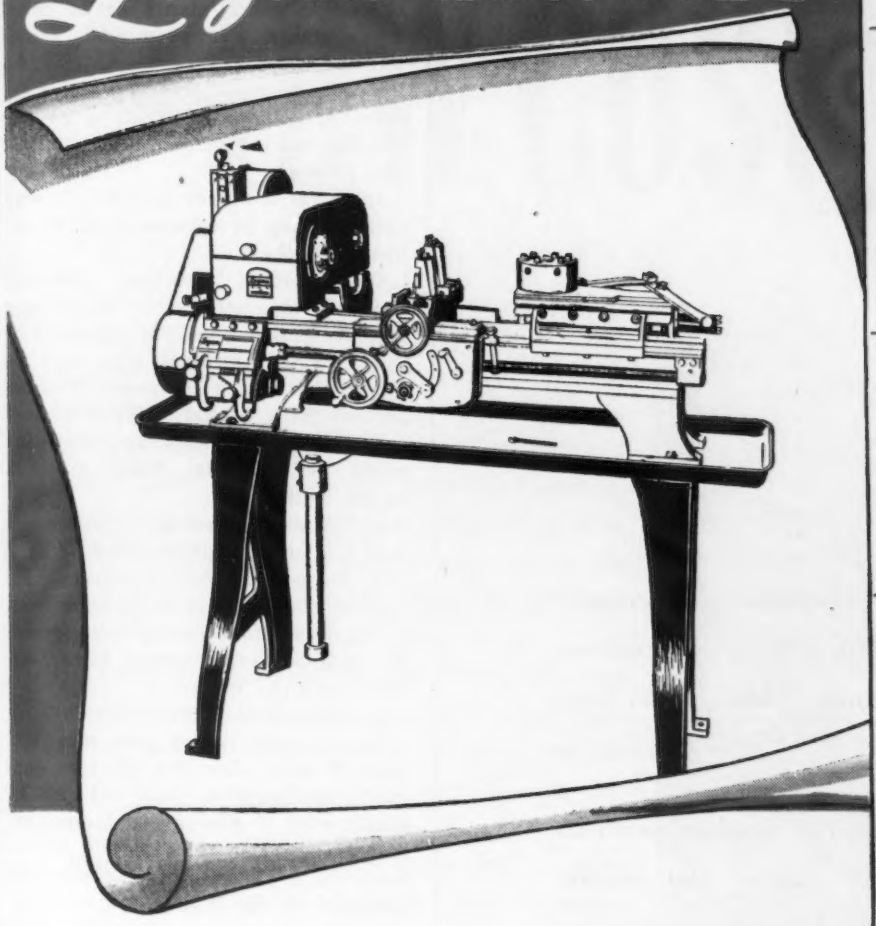

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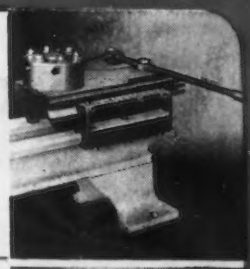
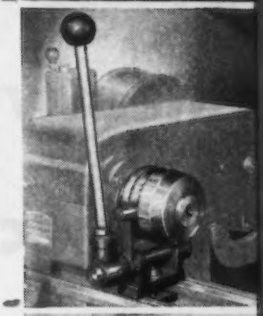
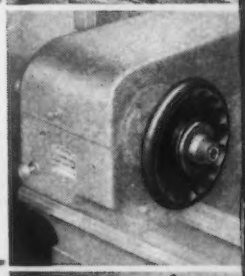
Six position, self-indexing. Fits bed of any Logan Lathe.



No. AC 210 PRODUCTION COLLET ATTACHMENT
Quick acting, lever type collet closer operates while lathe spindle is in motion. For Push type collets up to 5/8"



No. AC 201 SPEED COLLET CHUCK
Fits any lathe with 1½" x 8 thread spindle nose. Minimum overhang assures accuracy. For Push type collets up to 5/8"



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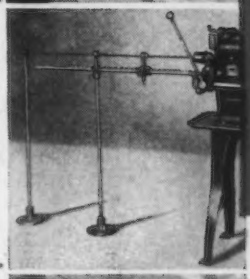
For Logan Hand Screw Machines. Uses Push type collets up to 5/8" capacity.



No. AC 165 and AC 166 PRODUCTION COLLET ATTACHMENT
Quickly attached to Logan Lathes. Operates while spindle is in motion. For Draw-in Collets up to ½" capacity.

No. AC 150 and AC 151 DRAW-IN COLLET CHUCK ATTACHMENT
Accurately chucks work between 1/16" and ½" capacity.

No. 438 3-JAW, 5-INCH UNIVERSAL CHUCK
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Need no separate back plates. For 1½" x 8 thread spindles.

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portant these days when a mistaken optimism as to the early end of the war is causing many workers to look for peacetime jobs.

Q. What about men released as the result of cuts in production schedules?

A. These men also need guidance in getting into new jobs. They are needed in other plants or in other areas where war production schedules are being increased. An increase in cutbacks would only emphasize the need for priority referrals to get the released workers promptly into urgent war jobs.

Q. What is meant by the reference "other hiring arrangements to be approved by the USES"?

A. Placement workers through union hiring halls, also by colleges and universities, will be approved by the USES. Approval also may be given other hiring channels. The important thing is that the USES channels enough workers to meet the needs for essential industry on a nation-wide basis.

Q. Then a member of a trade union need not go through the USES?

A. In general that is correct. He may be placed, as he has in the past, through the union hiring hall, providing definite arrangements have been made with the WMC.

Q. How about a war veteran?

A. A recent ruling gives the veteran 60 days after the effective date of his discharge to take any job he wants, even if it is in a non-essential industry. After that he will be referred to a job through the channels indicated by the WMC.

Q. Do part-time workers come under this plan?

A. In principle, yes. But local arrangements will be worked out to handle that situation. Ordinarily the very nature of this work makes it impracticable to place the same restrictions on the choice of part-time jobs as are placed on full-time workers.

Q. Is there any assurance management and labor will support the program?

A. The plan has been considered thoroughly by the national Management-Labor Policy Committee of the WMC and also by labor-management committees set up at regional, state, and area levels throughout the country. WMC officials everywhere—at regional, state and area headquarters—will follow the policy of discussing with representatives of both labor and management local plans prior to their adoption.

Q. Just how big a part do the area

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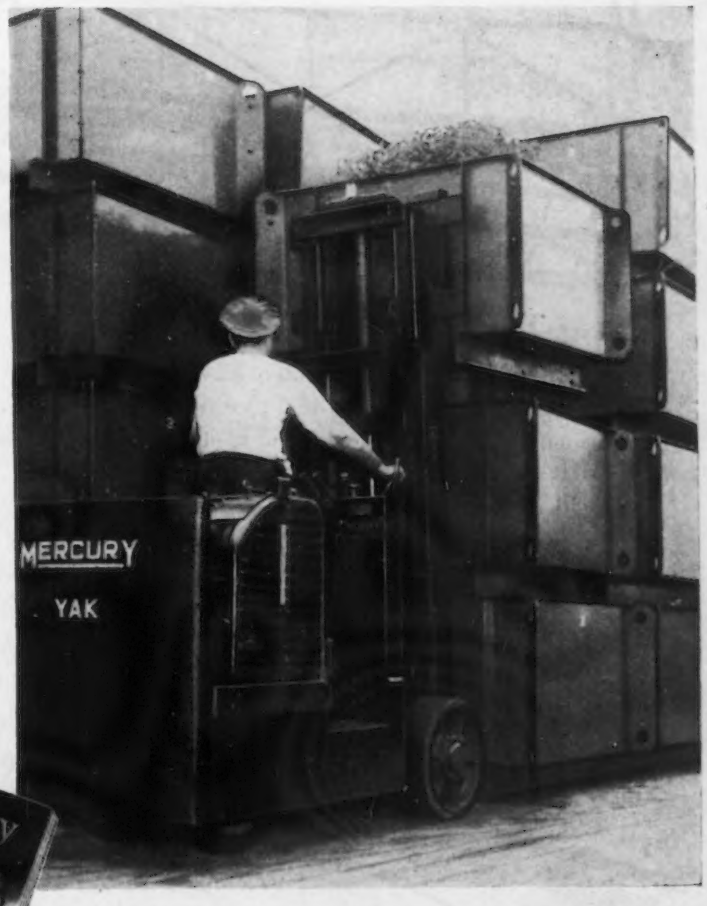
Tomorrow LOW COST }

Today — SPEED is the important requisite in material handling . . . and industrial trucks, tractors and trailers are providing the answer.

In war plants — materials are stored . . . moved through process . . . and made ready for shipment, quickly, efficiently and with the minimum of man power. In transportation — cars, trucks and planes are loaded and unloaded quickly and with maximum safety.

Tomorrow — In the postwar market with labor and material costs higher, and competition more acute, LOW COST will replace speed as the paramount factor. And here again power handling equipment will provide the answer.

Mercury Engineers are men thoroughly seasoned in all phases of material handling. They will be happy to consult with you on your individual problems. There is no cost or obligation for their services — wire or phone today.



A MERCURY "YAK" Fork Truck of 4,000 lbs. capacity transports steel skid boxes containing scrap metal from process to storage where boxes are quickly and efficiently tiered.

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The new MERCURY Catalog No. 7-11 contains valuable information for the handling executive. Write for your FREE copy.

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THE MERCURY MANUFACTURING COMPANY

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Again, WELDCO Crates
Replace Wooden Crates

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The WELDCO pickling crate pictured above is being used by one of the world's largest and oldest shovel manufacturers. The crate is 64″ long, 36″ wide, with 12″ sides and ends. It weighs 306 pounds and carries 1000 pound loads. Six Weldco crates in all were used to replace wooden crates in this plant.

Regardless of the type of product you are pickling — hollow and bulky articles such as cooking utensils, refrigeration and autobody parts, or small, heavy castings and stampings — The Youngstown Welding and Engineering Company can DESIGN and BUILD a long-life WELDCO basket or crate for you. They will be all-welded of Monel, stainless, or other alloys . . . whichever best fits your requirements. Merely tell us your needs . . . your inquiry will be answered promptly.

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FOR YOUR COPY

WELDCO

THE YOUNGSTOWN WELDING & ENGINEERING CO.

3712 OAKWOOD AVE., YOUNGSTOWN, OHIO

management-labor committees have in carrying out this new plan?

A. In addition to taking part in forming the local programs they will develop and recommend standards under the national policy to be followed by the USES and other groups in making referrals, and the establishing of manpower priorities and ceilings. They also will review the actions of the manpower priorities committees and receive appeals from employers on specific actions by the manpower priorities committees in setting an employment ceiling on manpower employment.

Q. Were the regional directors of the WMC consulted before the program was announced?

A. Every detail was considered carefully by the regional directors who approved the program and gave the Washington office assurance of their cooperation and support.

Q. Suppose a worker feels that the operation of the system has injured him in some way, what can he do about it?

A. He has the right to appeal—first to the WMC local organization and, finally, if he is still dissatisfied, to WMC headquarters at Washington.

Q. How about an employer who doesn't like the employment ceiling that may be fixed?

A. He too has the right to appeal. The WMC already has appeals machinery to handle cases of all sorts in which either the employer or employee feels he has a just grievance.

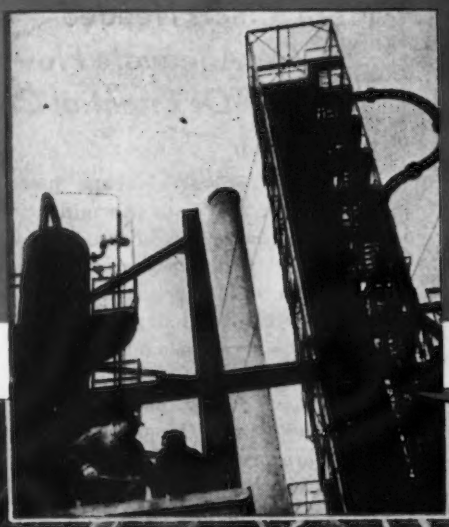
Q. Are any penalties provided for unauthorized hiring?

A. There are penalties, direct and indirect, but the WMC believes the self interests of management will be sufficient to make the plan effective. Authority for penalties can be found in the act giving the President extraordinary wartime powers and in certain other legislation.

Milestones

• • • **Towmotor Corp.**, Cleveland, celebrated 25 years of service in the materials handling field with a banquet on May 12, given in honor of its employees. The 800 men and women who attended were presented with a book published by the corporation entitled "25 Years—Towmotor." It tells the story of Towmotor from the time it was founded down to the present, and emphasizes the important role fork lift trucks are playing in the wartime movement of materials.

ALL KINDS OF STAINLESS EQUIPMENT ARE BEING WELDED WITH ARCOS ELECTRODES



This photograph was taken inside a clay tower lined with straight chromium sheets welded with Arcos Chromend HC electrodes by an oil refinery. The particular grade, chosen to meet the specifications required by this job, is one of the 42 available analyses on the regular production list of Arcos electrodes. ★ Fabricators are more and more looking to the complete line of Arcos Stainless and Alloy electrodes as the quick, sure answer to the successful welding of stainless equipment. ★ Get in touch with your Arcos distributor on your next stainless welding job.

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Columbus, Ohio ..... Williams & Co., Inc.
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New York, N. Y. ..... H. Boker & Co., Inc.
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Pampa, Texas ..... Hart Industrial Supply Co.
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A PROVED POWER SYSTEM READY FOR YOUR APPLICATION

Parker-engineered Fluid Power Systems are now in use in the chemical, marine, railroad, synthetic rubber, petroleum, Diesel, refrigerator, machine tool and other industries. New applications are constantly being developed in other fields. Yours may be one of them. A Parker engineer will know. Ask him, or, write direct to The Parker Appliance Company, 17325 Euclid Ave., Cleveland 12, O.

PARKER

More Miners Needed For Adequate Flow Of Essential Coal

Washington

• • • **More effective means** must be used to get men into the mines if industry is to get an adequate flow of coal needed to keep the nation's wartime machinery running at full speed, Paul V. McNutt, chairman of the War Manpower Commission, warned recently.

At least 30,000 more miners are needed right now, he said, adding that the operators regard this as a minimum. They would be happier if they could get 50,000, he said.

Chairman McNutt explained that the estimated deficit for the coal year ending April 1, 1945, is 39,000,000 tons or about a 20-day supply. This includes both bituminous and anthracite but the production of bituminous is approximately 10 times that of anthracite.

Getting men for the mines has never been a simple labor problem, Mr. McNutt explained, adding that the task has been made more difficult by the creation of millions of wartime jobs in other industrial fields. He pointed out that in 1940 the average employment in the coal industry was

INSIDE STORY: *J. Boyd, of Westinghouse Research Laboratories, checks visually the computed or empirical details of a bearing design, at East Pittsburgh, Pa. Oil, colored with red pigment, is introduced into the bearing and the lubrication effectiveness is immediately apparent.*

Looking For Quick Deliveries of STAINLESS STEELS?

The Stainless Steel situation has eased. Current deliveries are better than they have been for almost four years. To secure more durable products and reduce replacements, WPB has approved Stainless Steels for certain additional civilian applications.

This metal of many uses is being demanded for many essential industries, such as milk processing and cutlery, because of a multitude of advantages which substitutes fail to provide — its resistance to corrosion, heat and wear; its easy to clean, non-contaminating qualities; its high tensile strength and wide range of mechanical properties.

Rustless concentrates on Stainless Steels. Our specialized production facilities, research laboratories and complete services are at your disposal.

Quicker deliveries of Rustless Stainless Steels can now be made. May we quote on your requirements?

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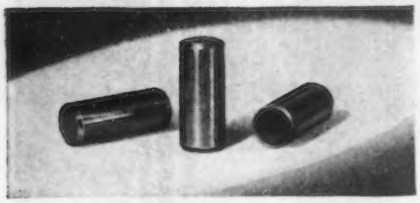
PRECISION PARTS

WEASELS and DIESELS



Small but vital . . .

Out in the vast Pacific, there is an extermination job to be done. Each Jap-infested island must be cleaned up as we go. Diesel-driven equipment plays an important part in each operation, and these little by-pass valves turned out by Ace are an important part of the Diesel engines.

Starting from bar-stock, they are machined, heat-treated, centerless ground on the outside diameter, and cylindrical ground on the angles. They are typical of Ace mass-production facilities, all located here under one roof.

Ace offers manufacturers the modern equipment and the engineering ingenuity to turn out small parts and assemblies calling for stamping, machining, heat-treating, or grinding—and to turn them out quickly and accurately. Send blueprints, samples, or sketches for quotations.

Send for this booklet. It gives the full story on Ace facilities.

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for Precision Parts

ARMY E NAVY

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530,000. This was increased slightly in 1941. Employment began a downward trend in 1942.

Thousands of men were taken from the mines to meet the demands of the armed services. Other thousands found themselves jobs more to their liking in war production plants and civilian activities. This downward trend has continued into this year. Employment now, Mr. McNutt pointed out, is around 450,000 while demands for fuel have increased.

The increased requirements for fuel, he explained, result from the greatly stepped-up activities of war production industries and essential civilian activities. Aside from the factories producing war materials, consumers calling for more coal are the railroads, electric power plants, other public utilities and metallurgical groups. Exports are also up and will, it is assumed, become greater.

Chairman McNutt expressed belief that although the labor situation in the mines is bad it would be a great deal worse than it is had it not been for the measures taken by the War Manpower Commission. He emphasized the importance of the recruitment campaigns that have been put on in all coal-mining areas and the cooperation shown by industry and the communities in the adoption of plans for the better utilization of labor, improvement of living and working conditions, and general compliance with and enforcement of area stabilization programs.

Direction Facilitates Advance Orders

Washington

• • • **To permit railroad** operators to place a portion of their orders for specified items of car materials in manufacturers' production schedules, rather than attempt to issue orders to firms for future quarters on form WPB-2585, WPB has issued Direction 3 to Preference Rating Order P-142.

This direction permits railroad operators to place advance orders for delivery during each of the three calendar quarters following the quarter in which the order is placed for up to 75 per cent of their first quarter 1944 authorization of the following items: air brakes, AB, Code No. CA on form WPB-2585; hand brakes, power, Code No. CB; brake beams, Code No. CH; couplers and coupler bodies, Code No. MA; bolster springs, car, Code No. MC.

With the exception of power hand brakes (Code No. CB), a railroad operator may use the same preference ratings, and to the same extent, as were authorized for the particular item for the first quarter of 1944. For power hand brakes, he may use only a rating of AA-3 for advance quarters, regardless of the ratings authorized for that item in the first quarter of 1944. Direction 3 applies only to railroad operators under order P-142 and not to transit or other operators. This direction does not relieve the rail operator from applying each quarter on form WPB-2585 for firm authorizations in accordance with the provisions of order P-142.

Announce Heating Systems Allotment

Washington

• • • **WPB has announced** the 1944 third quarter allocation of controlled materials for the production of heating system controls for some 950,000 residential, commercial, institutional and industrial heating plants for the 1944-45 period. The allocations consist of the following: carbon steel, including castings, 1510 net tons; alloy steel, including castings, 130 net tons; sheet and ships, copper base alloy, 116,000 lb.; rod, bar and wire, copper base alloy, 192,000 lb.; tubing and pipe, copper base alloy, 3000 lb.; copper base mill products, 25,000 lb.; copper wire mill products, 76,000 lb.; copper and copper-base foundry products, 113,000 lb.; aluminum products, 2000 lb.

Advance allotments for the fourth quarter of 1944 will be issued in amount not to exceed 75 per cent of the quantities authorized for the third quarter.

This production of heating controls is a part of the Fuel Conservation program. Manufacturers desiring to produce any specified number of the types of equipment which are listed by WPB were told to file immediately a separate CMP-48 application for the necessary material

"*Pin Money*" was far from small change — until BRASS made it so

THERE was a time when common brass pins cost about $2.00 a dozen, when they were imported from France to the England of Henry VIII. And "pin money," then, was serious business . . . a separate allowance from husband to wife to buy these necessities of life.

As late as 1812, English pins sold in this country for a dollar a package. But then Connecticut Yankee ingenuity got to work on good Connecticut brass. Soon came the solid head . . . replacing the finger-snagging wire-wound head . . . and other cost-cutting improvements. Today the great bulk of the nation's pins come from the Naugatuck Valley. And "pin money" is counted in fractions of a cent, where it used to be counted in dollars.

This is one of the countless ways in which the unique qualities of Brass . . . workability, durability, non-corrodibility . . . have relieved dire difficulties for manufacturer and consumer alike, *to the great advantage of both.* And for all such standard uses, as well as for dramatic new uses to come, Bristol Brass is the basic reliance of scores of fabricators of products made from sheet, rod, and wire. And after this war is won, Bristol Brass will return (as from four other wars) to production of all the various peacetime alloys required by each manufacturer for his own special needs . . . alloys characterized by the same *uniformity of quality* that has built the name of Bristol Brass for the past 94 years.

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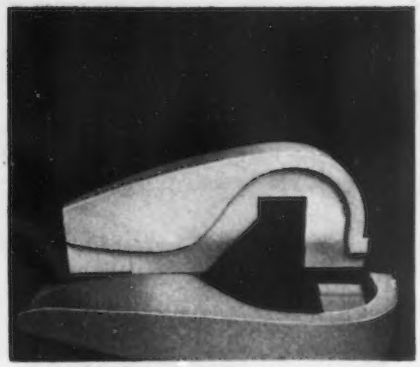
★ BUY BONDS TO BUY BRASS FOR BULLETS ★



HIGH TIME THAT YOU "DISCOVER" STRENES METAL

● This is no idle suggestion for engineers in many lines have tried and adopted Strenes Metal — are regularly specifying it wherever possible.

Builders of automobiles, trucks, tractors, farm implements; refrigerator, stove, metal furniture manufacturers; designers of fans, blowers, bicycles; almost anything involving drawing and forming operations.

They are able to have Strenes Metal cast to shape — usually to 1/16", saving 50% to 75% of the time ordinarily required to machine off excessive stock. They are obliged to redress their dies about ⅓ as frequently as usual. Runs of 1,000,000 deep drawn parts are not unusual.

That is just part of the Strenes story. Why not get the rest of it? Isn't it high time you also "discover" Strenes Metal for drawing and forming dies?

THE ADVANCE FOUNDRY CO.,

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Strenes METAL

H. K. Work Elected Chairman of I. R. I.

• • • **Harold K. Work**, manager, research and development, Jones & Laughlin Steel Corp., Pittsburgh, was elected chairman of the Industrial Research Institute for the ensuing year at their sixth annual meeting held in Pittsburgh. John M. McIlvain, research and development, Atlantic Refining Co., Philadelphia, was elected vice-chairman; Charles S. Venable, director of chemical research, American Viscose Corp., Marcus Hook, Pa., and Harry M. Williams, vice-president, National Cash Register Co., Dayton, Ohio, were elected to the executive committee.

The meeting, which was attended by 85 industrial research executives and their guests, was held on May 19 and 20. Edward R. Weidlein, director, Mellon Institute of Industrial Research, Pittsburgh, as guest speaker, discussed the future of industrial research. Earlier, Maurice Holland, Industrial Research adviser, New York, talked on the place, influence, and obligations of the institute in the national research structure.

Salary and patent problems were considered at length during the meeting with J. M. McIlvain discussing existing research salary conditions in industry. A round table conference was conducted by R. C. Benner, research consultant, Carborundum Co., Niagara Falls, N. Y., in which the various methods of patent procedure used in the research organizations of member companies were discussed. Mr. Benner was assisted by G. J. Easter, of Carborundum, A. J. Leopsinger, Grinnel Corp., R. N. Poole, Curtiss-Wright Corp., and H. M. Williams, National Cash Register Co.

Cooperative research during the war in the aircraft industry was the subject of a paper by Maurice Nelles of WPB and Lockheed, and the part which the manufacture of rockets, jet propulsion planes and gas turbines will play in postwar industrial expansion was envisioned by G. Edward Pendray of Westinghouse Electric & Mfg. Co.

The meeting was concluded by a question and answer period on current problems of members. The next meeting of the institute will be held in late September.

Pittsburgh Scientist Refutes Theory

Pittsburgh

• • • **The theory of** magnetic current was refuted by a Pittsburgh scientist who claimed that rigidity controlled experiments had proved that magnetism does not flow in the same manner as electric current. The age old theory is that magnetism has force and power but no movement and is unlike electric current in which electrons flow along a copper wire.

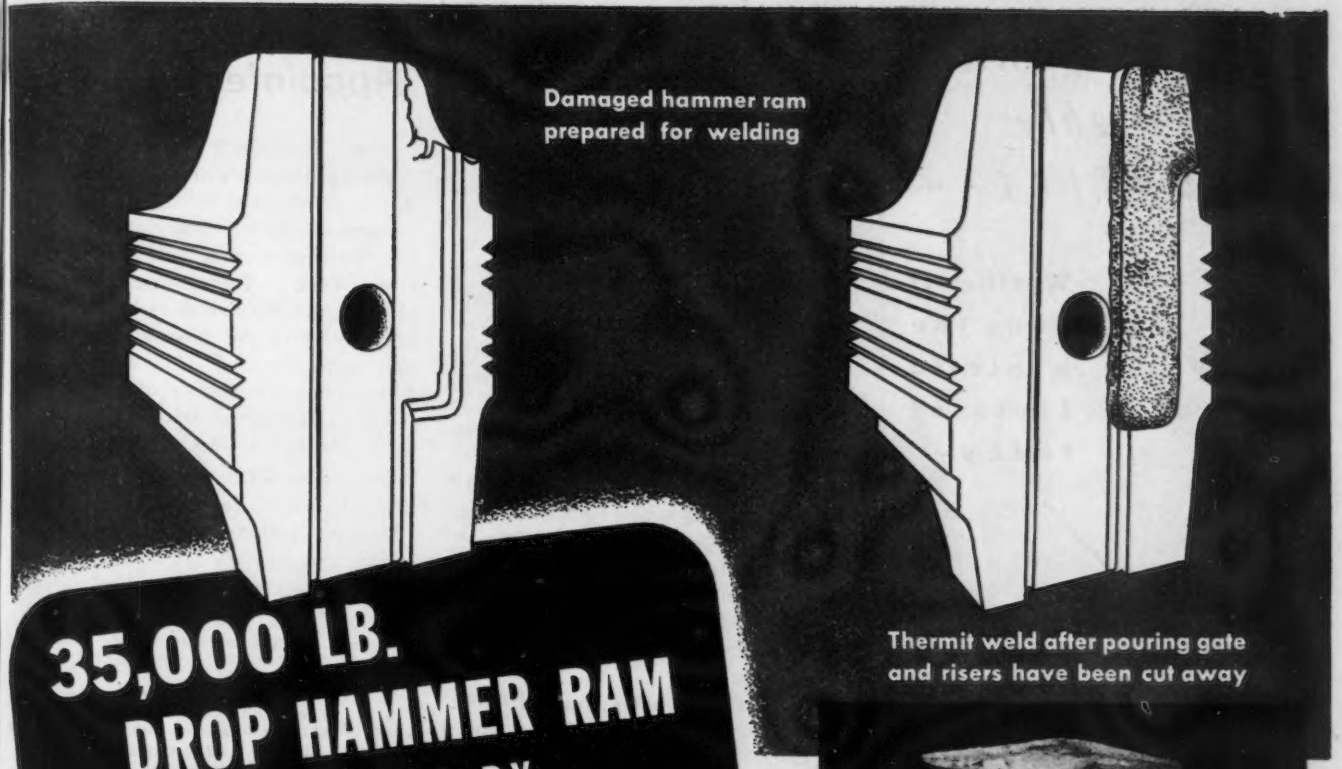
Dr. Jacob E. Goldman, who is in charge of permanent magnetic research at the Westinghouse Research Laboratories, speaking before the American Physical Society, recently described four experiment on which his conclusions to the negative were based.

In the first experiment, Dr. Goldman placed a solution of sulphuric acid in a glass tube between iron poles covered with paraffin of a horseshoe shaped permanent magnet. Bubbles soon appeared in the solution. If they were the result of liberated oxygen caused by a magnetic current passing through the water, then it would seem that there was a movement or flow of current from one pole of the magnet to the other.

To test his first conclusion, Dr. Goldman conducted a second experiment. The acid solution was boiled to drive off the dissolved air and oxygen. Then the paraffin-coated poles of the magnet were again immersed in the solution. This time no bubbles appeared supporting the conclusion that no magnetic current had passed between the poles of the magnet, and that the bubbles had been caused by the action of dissolved air and oxygen.

In the third experiment the paraffin coating was removed and the iron surface of the magnet poles brought into direct contact with the acid solution. There were violent bubbles, but the magnet still retained its original strength indicating that no magnetic current was being drawn off.

As a final check, Dr. Goldman covered the entire pole structure with paraffin, except the pole faces, and then immersed in sulphuric acid of a much higher concentration. It was allowed to remain in solution for many hours. This result, combined with the findings from the previous three experiments, prove that there was no flow of magnetic particles between the poles and that the hypothesis of magnetic current is not supported by the evidence.



Damaged hammer ram prepared for welding

Thermit weld after pouring gate and risers have been cut away

35,000 LB. DROP HAMMER RAM REPAIRED BY *Thermit Welding*

When news of the damaged 35,000-lb. drop hammer ram first reached the front office, it caused considerable concern. Here was a part that might take months to replace, and ordinary welding was not considered adequate to withstand the shock of the hammer blows. Fortunately, the plant executives knew about Thermit welding and had the part back in operation within five days.

The chief advantages of the Thermit process for the repair of heavy parts are the great strength and durability of the weld... stronger than the casting... and the fact that stress relieving is not required and machining is seldom necessary. The result is a saving of many valuable man hours.

Because it meets heavy-duty requirements, the Thermit process is also used in the fabrication of large units such as stern frames, steel mill rolls, crankshafts—in which smaller castings or forgings are welded together. The difficulty of obtaining sound metal where large castings must be poured is eliminated, and shipping and handling of smaller units is easier.

Repaired ram; pouring gate and risers in place.

Send for booklet
"THERMIT WELDING"
describing the Thermit process in detail.

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WE CAN HELP YOU GET A HEAD START ON POSTWAR MARKETS because---

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PLAN YOUR POSTWAR PRODUCTS WITH PARTS *from*

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Three Man Fact Panel Appointed

Washington

• • • A three man fact-finding panel that will hear representatives of the eight companies and three unions involved in the eight foremen dispute cases now pending WLB action has been appointed. The panel will hold its first hearing, open to the public, in Detroit on June 12. The panel will make a factual report to the WLB on certain general questions involving foremen disputes, in addition to the specific issues certified to the board in the current disagreements, such as grievances, wages, and seniority.

The board, in taking jurisdiction, excluded issues concerning bargaining rights and alleged discriminatory discharges under the National Labor Relations Act.

The eight companies that will present testimony to the panel are: Murray Corp. of America, Briggs Mfg. Co., Chrysler Corp., Republic Steel Corp., Maryland Drydock Co., Packard Motor Car Co., Bohn Aluminum and Brass Corp., and Baldwin Locomotive Works.

The Foremen's Association of America, Detroit's newest independent union, is involved in disputes with all companies except Maryland Drydock Co., Baltimore, and Baldwin Locomotive Works, Eddystone, Pa. The Marine and Shipbuilders Works, CIO, is involved in the foremen dispute at Maryland Drydock Co., and the International Association of Machinists, AFL, is concerned with the disputes at Baldwin Locomotive Works.

The new WLB panel will make a factual report to the WLB on the following matters with respect to each of the cases:

1—The nature and gravity of any unresolved grievances of the foreman.

2—The present or potential procedures available for the settlement of these differences without the necessity of further governmental action.

3—The history and effects of any collective relationships between the foremen's organizations and the companies.

4—The nature and composition of the foremen's organizations in each of the plants involved, and the duties performed by the various types of supervisory employees within each plant.

5—Any other facts which the panel might find to be of importance to the board in determining what action it should take in the foregoing cases.

Farm Equipment Production Falls

• • • A report has been issued for 1943 by the Department of Commerce covering the sale and production of machinery, implements, tools, and other farm equipment, the statistics of which were collected from a mailing list of 1167 manufacturers who reported in the 1942 survey. These manufacturers are on the limitation and allocation records of the WPB and are primarily engaged in the manufacture of farm equipment. Certain commodities have been entirely eliminated from the 1943 survey, while others not used primarily on farms have been incorporated in a separate survey and issued on a different form.

The report shows a decrease of five per cent in the total value of production. This decrease would have been considerably greater had there not been an increase in the production of tracklaying-type tractors of 30 per cent, which were manufactured principally for military and industrial purposes. There was a decrease of 28 per cent in planting, plowing, harvesting and other basic farming operations.

Sales by manufacturers in 1943 shows a decrease of three per cent from 1942. This figure again would have been larger but for the tracklaying tractors, which sale increased 42 per cent and their attachments and parts, 39 per cent. The attachments and parts comprise 40 per cent of the total production and 41 per cent of the total sales. These sales statistics do not cover sales by dealers to consumers but refer only to sales by manufacturers.

The value of production for 49 companies amounted to $195,274,693. The remaining 1118 reported production valued at $418,181,401. For 1942, the production value for 97 companies amounted to $321,472,558.

This survey contains two tables. Table one presents statistics on the value of farm equipment, manufactured and sold from 1935 to 1943, and by classes of products for 1940 to 1943. Table two presents the number and value of products manufactured and sold by kind, 1943 and 1942.

LAYING EGGS WITH SPLIT SECOND TIMING
or HOW A BOMBER DROPS A BOMB

Only forty-five seconds for the run! The bomb sight is set and the bombardier waits for two hairs in the sight to cross. Here's what happens when the hairs cross and it's all done automatically—an electric eye winks and in one 1/50th of a second, little mechanical fingers on each bomb shackle open and *the bombs are away!*

This is precision bombing. Everything must function with infinite speed and accuracy, and if those fingers on the shackles miss their timing the salvo is a miss. Few people know about the importance of these little metal fingers weighing only a few ounces, that hold a bomb which may weigh a ton.

Small, but sturdy fingers holding tons regardless of bumps and shocks, holding the bomb until that vital split second when they open and the bomb is dumped. This bomb shackle mustn't shake, it mustn't break. It must function in all kinds of weather and temperatures. It's a precision instrument that can't be babied once it's installed—a delicate little piece of mechanism having the strength of a steel base.

In the last two and a half years Pollak has delivered thousands of these bomb shackles and other war equipment to our Armed Services for which we have received the Army-Navy "E" and four stars. This is our job now, but when peace comes we will again be manufacturing parts and products for other companies. If there is a possibility that you may need a part or an entire product developed or manufactured for you, it may be of great advantage to your company to have Pollak do it. Certainly it is good business to at least learn in detail what Pollak has to offer you. We will be glad to put the complete story before your executives.

POLLAK
PRECISION
PRODUCTS

The original Army-Navy "E" award to this company has been renewed four times. Each of the four stars on this flag symbolizes six months of exacting service to our Armed Forces.

POLLAK MANUFACTURING COMPANY · ARLINGTON, NEW JERSEY

DEVELOPING · DESIGNING · FABRICATING · STAMPING · SPINNING · WELDING · FINISHING · MACHINE WORK

MASTERDRIVES

NOW AVAILABLE TO 750 SPECIFICATIONS

Engineered for practically any machine tool . . . and guaranteed as complete units.

INCREASE PRODUCTION . . . Masterdrive efficiency helps you produce more, faster.

ELIMINATE LINESHAFTING . . . Masterdrives free your tools of lineshaft hazards and limitations, yet retain flexibility of belted units.

REDUCE MAINTENANCE . . . Masterdrives are powered by famous Master gear head motors, proved dependable by the 3 million now in service. And each Masterdrive is complete . . . motor and drive in a single unit.

One responsibility—MASTER.

MASTER

THE MASTER ELECTRIC COMPANY

INDUSTRIAL EQUIPMENT DIV. — DAYTON, O.

Rheem Buys Into Platt-LePage Aircraft

• • • **Rheem Mfg. Co.** has purchased a large stock interest in the Platt-LePage Aircraft Co., Eddystone, Pa., one of the country's leading helicopter companies. By arrangement with other large stockholders, Rheem Co. will take an active part in the management of Platt-LePage. Rheem is also licensed to use the patents and designs of Platt-LePage. This affiliation makes it possible for both companies to produce helicopters in substantial number for military purposes during the war and for commercial and private uses following the war.

Rheem is currently manufacturing parts and sub-assemblies for PBY patrol bombers, Liberators, Coronado bombers and P-38 fighters at two plants in Los Angeles and a plant in Birmingham, Ala. The desire to find postwar use for airplane manufacturing facilities and to furnish continued employment to aircraft workers, was an important factor in determining the entrance into the helicopter field by Rheem, it was stated.

New Steel Clad Mine Rail Tie Saves 40% in Tie Costs

Pittsburgh

• • • **An improved type** of steel cladding for timber rail ties for use in mines has been announced by the Koppers Co. This type of tie, known as Koppers Ar-Moored steel ties, is reported to have resulted in a 40 per cent monthly saving in tie costs in one Pennsylvania mine installation.

These ties are constructed with a creosote pressure-treated oak base to which is fitted a Bethlehem Steel mine tie secured to the wooden base with special nuts and bolts. These ties, available in 2, 3, or 4-in. bases for a variety of mine haulage tasks, are furnished with either staggered or outside stationary clips.

Drop Forging Lecture Course

• • • **More than 100** technical schools and colleges have adopted an introductory lecture course on "Impact Die Forging," commercially known as drop forging, prepared by Princeton University from material made available from the files of the Chambersburg Engineering Co., Chambersburg, Pa. The text, which is largely pictorial in character, is available from the Chambersburg company at $1 per copy. With a set of the booklets goes an instructor's manual.

After briefly discussing the advantages of impact forgings and the materials that are forgeable, the text then describes the elements of board and steam drop hammers. Typical products forged on each type are illustrated. Modification of design of parts to make them more suitable for the drop forging process is brought out by a simple example and elements of die design in relation to the various stages in the forging process are also illustrated. The text concludes with tabular matter relating to forging tolerances.

Particle Size Determination For Metal Powders

(CONCLUDED FROM PAGE 87)

through the particles in cm., and r is the radius of the particles in cm.

Bonding Influences

In "Bonding Metal Particles by Heat Alone Without Pressure," Laurence Delisle, research fellow of the International Nickel Co. in the department of powder metallurgy, Stevens Institute of Technology, reported on the results of microscopic examination and a few physical tests of specimens made of metal powder by sintering in hydrogen for three hr. at various temperatures. The purpose of the study was to study the effect of six variables on the extent and nature of the bond formed when loosely packed metal powders are heated to different temperatures. These factors are: (1) Temperature; (2) shape of the particles—spherical and flaky; (3) size of the particles—coarse, medium, fine and blended; (4) metals—iron, copper and silver; (5) crystalline structure of the particles—annealed and cold worked, and (6) composition—effect of carbon in iron powders.

It was found that the particle size is a very important influence on the extent to which bonding between particles proceeds and on the density of the sintered specimen. For the particle sizes studied, ranging from a few microns to 1mm. in diameter, the finer the particle size, the better the bond and the denser the specimen. The effect of particle size on the temperature at which bonding starts could not be established. Cold working of the powder seems to lower the temperature at which bonding starts as does the addition of small percentages of graphite to electrolytic iron.

WHAT DO *You* PAY FOR IN CARBIDE TOOLS?

Carbide tipped cutting tools have done such a phenomenal job in increasing production, cutting costs and improving quality that it is easy to overlook some fundamentals when we talk about carbides.

For example, tool cost per piece with carbides depends even more on the know-how of tool design, grade selection, precision, manufacture, and application than it did with high speed steel tools.

To meet mass tooling requirements for war, everybody in the carbide industry—including ourselves—has been producing so-called "standard" tools. Even in peacetime, of course, there will be a place for such tools, but we also know that when COST PER PIECE is an important consideration, the lowest priced tool is not necessarily the best.

We at T.C.T. have been producing carbide cutting tools since they were first introduced in the United States. We know from experience that T.C. tipped tools, tailored for a specific job more than pay for their initial cost. It is well at this time not to lose sight of this fact, when most of us have become accustomed to ordering standards to obtain something in a hurry.

TUNGSTEN CARBIDE TOOL *Company*

2661 Joy Road, Detroit 6, Michigan

TCT

Rebuilding Program Puts Used Army Equipment Back Into Service

Cleveland

• • • The Army rebuilding program for used military vehicles and equipment has helped substantially in putting back into service such equipment that has been deemed unfit for use. This program was inaugurated early in the war, and at that time most of the equipment was returned from camps where it was used in training.

In this immediate area the Federal Machine & Welder Co., Warren, Ohio, and Truscon Steel, Youngstown, Republic Steel subsidiary, are busily engaged. The truly big time, heavy weight job of rebuilding is being done at Federal where the M4-A2 tank is being rebuilt from stem to stern. Truscon is rebuilding the M3-A1 scout car.

At Federal, where the M4 tank was once built, nearly 350 giant 33 ton tanks are in the process of rebuilding or awaiting the process. These rebuilt units are not only in perfect condition mechanically but also have been subject to as many as 1300 modifications which make them as nearly possible up-to-date with the latest tank built.

When it is realized that tanks cost approximately $50,000 new without armament, radio, special sighting or stabilizing equipment, the value of rebuilding can be readily appreciated. One estimate places the completely equipped M4 tank value at about $100,000. The average rebuilding and modifiying cost is placed at about $20,000 each by the company.

In consideration of the steel saving, the company estimates that about 10 tons of the total weight is made up of the armor plate hull, another 10 tons in armor castings and about 10 or 12 tons of alloys. The balance of the material is non-ferrous, rubber, etc. Nearly all of this steel is salvaged and possibly less than one ton of new steel goes back into the tanks on rebuilding with most of this represented by modification, armor plate protective patches and new attachments.

The hull, the armor castings (mainly turret), the main drives and the engines are reused in rebuilt condition, as are the bogey wheels, suspension, tracks, the turret ring, gun sights, stabilizers, armament and every usable or reconditionable part.

It was explained by M. S. Clark, president of Federal that the tanks were all originating from training and maneuver areas. He stated, however, that each tank was being rebuilt suitable for combat purposes and as nearly comparable to the modern tanks as modification would permit.

It was indicated that while the tanks could fight in active service that they might likely see some less severe service such as occupation duty. Since these tanks are not fired upon by heavy ammunition during training no patching of shell holes is required.

One of the most troublesome problems encountered by Federal in reconditioning tanks has been supplying sufficient spare parts. Each 200 tanks delivered must be accompanied by a full set of spares sufficient to keep the group repaired fully for one year in the field. A large part of this work has been subcontracted, but finding facilities and sufficient manpower to produce the spares has been difficult.

It was also learned that further rebuilding on other models of tanks is contemplated when this current lot has been turned out.

The Truscon division of Republic, while playing a slightly less spectacular part in the program, is turning out completely reconditioned and modified M3 scout cars originating from the same usage. About 200 such rebuilding jobs were turned out during April and another large group will be completed during May.

This contract is of fairly short duration as less than 400 cars have been offered for this servicing, although more are known to be in need of service. Thorough reconditioning has been all that was required on most scout cars so far and of the original 200 in April only four motors and a few front axles were required in the way of heavy replacements. Spares go with each car, designed to meet the modifications made. Steel replacement is negligible while the salvage is almost total. The scout car's original cost is something over $7,000, while rebuilding costs are only a slight fraction of that figure.

RENOVATING JOB: *Battered, war-weary tanks pass along into the "beauty shop" of the Federal Machine & Welder Co., at Warren, Ohio. At left, other tanks pass out of the plant after being repaired. Army re-building and repair program saves taxpayers thousands of dollars.*

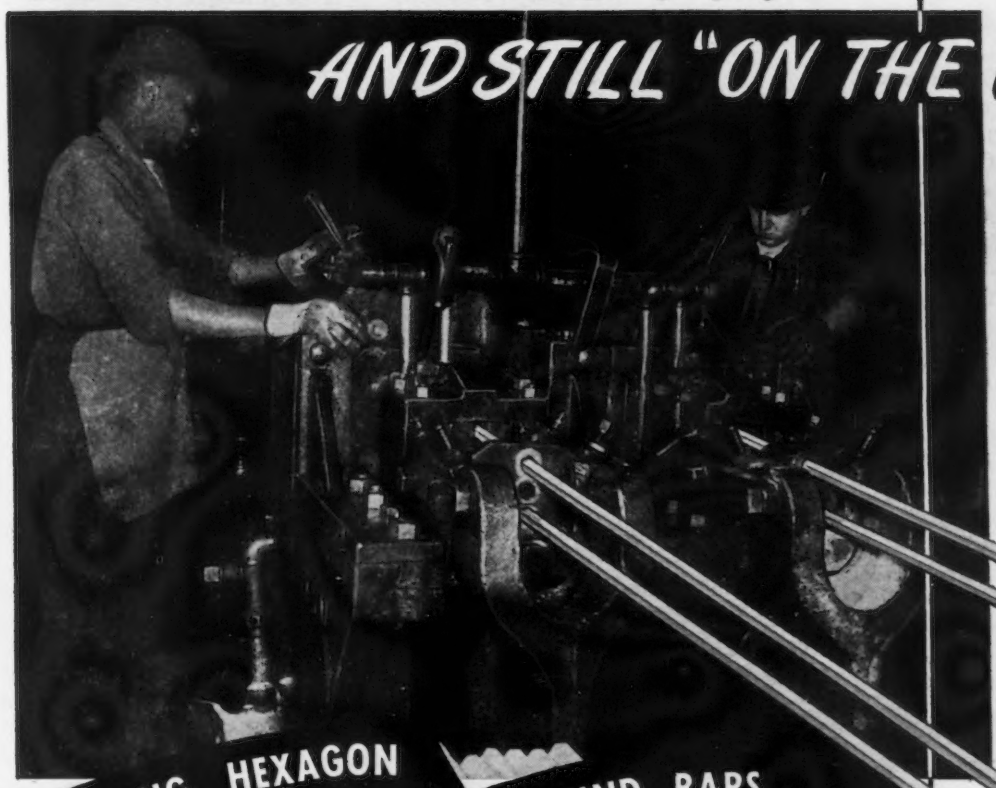
Whiting Heads OPA Groups

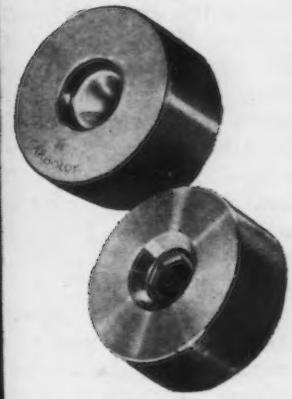
• • • Appointment of J. T. Whiting, president, Alan Wood Steel Co., Conshohocken, Pa., to the General Steel Products and the Pig Iron Industry Advisory Committees was announced by OPA recently.

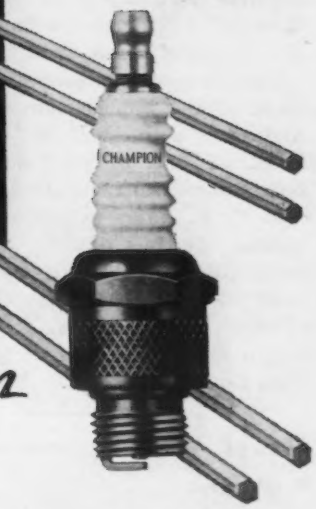
Mr. Whiting was the pig iron committee's first chairman, having served in that capacity from October, 1942, to May, 1943. He gave up the post to become deputy director of the Steel Division of WPB. He became director in July, 1943, and resigned from that post in March, 1944 to return to his company.

• 2000 tons . . .

AND STILL "ON THE NOSE"







DRAWING HEXAGON AND ROUND BARS . . . at Champion

Here's what top performance with Standard Carboloy Dies means at Champion Spark Plug Company: (1) *Extra long die life!* . . . Drawing hexagon and round bars up to size 1⅛", Standard Carboloy Dies have drawn 2000 tons to date and are still "on size." Less than .0001" wear. (2) *Extra fine finish!* . . . finish so fine that subsequent polishing is unnecessary. (3) *Extra close tolerances!* . . . uniform size from end-to-end of bars saves on chucking adjustments for subsequent automatic machining; greater production at low end of tolerance results in more feet from each bar. (4) *More continuous bench operation!* . . . long intervals between die servicing. (5) *Fewer rejects!* . . . 90% reduction in rejects with Standard Carboloy Dies.

At Champion—as at leading mills throughout the country—the plus values in every Standard Carboloy Die pay extra dividends in quality and economy.

Standard Carboloy—Developed die finishing and servicing equipment at Champion assures rapid servicing whenever required.

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COMPLETE DIE SERVICE FOR WIRE, BAR, TUBING AND SHEET METAL

WPB Makes Steel Division Appointments

Washington

• • • **WPB Steel Division** Director Norman W. Foy, recently announced the appointment of S. A. Crabtree to be assistant director for Program and Distribution and vice-chairman of the Division Requirements Committee. Mr. Crabtree succeeds Joseph L. Block, who continues, however, as deputy director of the division. Mr. Crabtree has been deputy assistant director for Production, Steel Division. In addition to his new duties, he will continue as chief of the Alloy Steel Branch. His home is in Chicago.

Succeeding him as deputy assistant director for production is H. M. Francis, who at the same time will continue his position as chief of the Wire and Cold Finished Bars Branch. Mr. Francis comes from Cleveland.

Simultaneous announcement was made of the appointment of George Anderson, a resident of Worcester, Mass., as chief of the Cold Finished Bars Section. Mr. Anderson will succeed V. R. Bates, whose resignation became effective May 31, 1944. The resignation of J. W. Owings, deputy chief of the Pipe Branch, became effective May 31. Mr. Owings will return to the Youngstown Sheet and Tube Co., Youngstown.

Tidwell Wins Appointment

Washington

• • • **SWPA Administrator** W. L. Clayton, has appointed Major William P. Tidwell, Secretary of the Surplus War Property Policy Board. On May 30, Major Tidwell reverted to an inactive status from the Army Service Forces which he joined in October, 1942, after five years with Crucible Steel Co. of America. Previously, for 15 years, he was with the Dow Jones publications in New York, Boston and Detroit.

S. W. Anderson Is Promoted

Washington

• • • **Samuel W. Anderson,** who has been serving as Deputy Vice Chairman for WPB Metals and Minerals since Jan. 1, has been appointed Program Vice Chairman and Chairman of the Requirements Committee. Mr. Anderson joined the staff of the Aluminum and Magnesium Division of OPM in October, 1941, and served in that division until his appointment as Deputy Vice Chairman. Before entering OPM he was associated with the Suchar Process Corp., an engineering firm in New York.

Turk Made President Porcelain Enamel Institute

Cleveland

• • • **After an interesting** discussion of the many new processes now available to the enameler and the proposed plans for more extensive use of porcelain enamel signs after the war, delegates to the 13th annual meeting of the Porcelain Enamel Institute elected officers for the forthcoming year.

The resignation of Charles S. Pearce, secretary and managing director of the Institute, was accepted. Edward Mackasek, former executive vice-president of the Beaver Enameling Co., Ellwood City, Pa., was elected to the secretarial post.

Other officers elected were: R. H. Turk, executive vice-president, Pemco Corp., Baltimore, president; O. J. Heyer, president, Chattanooga Stamping & Enameling Co., Chattanooga, Tenn., vice-president; Joseph T. Penton, president, California Metal Enameling Co., Los Angeles, Cal., vice-president; and William Hogenson, president, Chicago Vitreous Enamel Product Co., Cicero, Ill., treasurer.

CITATION: *Lieut. Gen. Brehon B. Somervell (left), commanding general, Army Service Forces, pins the War Department meritorious civilian service medal on Brig. Gen. Thomas S. Hammond, chief, Chicago Ordnance District, at Chicago. Gen. Hammond was former president and general manager of the Whiting Corp., Harvey, Ill.*

COMING EVENTS

June 19-22—American Society of Mechanical Engineers, Pittsburgh.

June 26 to 30—Annual Meeting, American Society for Testing Materials, New York.

Oct. 5-7—SAE National aircraft engineering & production meeting, Los Angeles.

Oct. 5-6—AIME Electric furnace steel conference, Pittsburgh.

Oct. 10-11—Gray Iron Founders' Society, Inc., Cincinnati.

Oct. 12-14—The Electrochemical Society, Inc., Buffalo.

Oct. 16-18—AIME Fall meeting, iron and steel division, Cleveland.

Oct. 16-20—American Society for Metals, Cleveland.

Dec. 4-6—SAE National air cargo meeting, Chicago.

Gray Iron Founders Plan War Meeting at Milwaukee

• • • **The "desperately** critical" wartime manpower shortage problems of foundries, now a major concern, will focalize discussion by government officials and foundry industrial leaders at the regional conference of gray iron foundry management executives to be held in Milwaukee, July 6, under the sponsorship of the Gray Iron Founders' Society, according to W. W. Rose, the society's executive vice-president.

The one-day meeting, third in a series directly related to vital war and postwar problems confronting gray iron management, will also consider OPA's ceiling prices on castings and foundry cost accounting, both of which are seen to have an important bearing on the twin "desperate" problems of castings production and manpower. Discussions, too, are expected to direct attention to policies, programs, and activities of War Manpower Commission, War Labor Board, Selective Service and the United States Employment Service.

Vice-Chairman of Regional War Labor Board Has Retired

Chicago

• • • **Dr. Dale Yoder** of the University of Minnesota retired as vice-chairman of the Sixth Regional War Labor Board, Chicago, but will remain as public member on a part time basis, Chairman Edgar L. Warren announced recently.

Look at the Might in this Midget

FACT: The Apex Heavy-Duty universal joint has the highest strength-weight ratio of any joint in its class. FACT: It has the highest resistance to vibration and fatigue-failure. FACT: It will withstand temporary axial overloads 80% greater than its rating, and temporary torsional overloads from 60% to 150% greater than its rating *without binding.*

Basically two things give Apex joints their unprecedented strength, lightness, and life span: the unique design of the joint and the exclusive Apex cover. The latter seals lubricant in, seals trouble out, reduces wear to a minimum, and in addition cuts fatigue-producing vibration, extending joint life and safety factors beyond all previous limits.

Five sizes; torque ratings to 10,000 inch-pounds; exceed all requirements of current AAF Specification for Class 2 Universal Joints; fully meet AAF Winterization directives. Write for Bulletin No. 103.

APEX Aircraft Universal Joints

Exclusive Licensees Under F. & S. Patents

THE APEX MACHINE AND TOOL COMPANY • DAYTON 2, OHIO

The Practical Postwar Car

By Brooks Stevens

(CONTINUED FROM PAGE 118)

meeting the other die cut edge of the Lucite top and not leaking.

There has been considerable speculation as to the use of molded plastic body panels and fenders to replace steel. This is doubtful at least in the first postwar cars. My fear is that complete consideration as to how these body elements would be molded is seldom explained. These methods (those developed to date) are not to be compared with the speed of executing steel stampings. Nor can we compare the use of 3c. a lb. raw material steel with possible plastic prices ranging from 45 to 90c a lb.

Aluminum production has been expanded tremendously. The auto industry has been through one period of experience with aluminum bodies and the material still offers difficulties in fabrication, welding, and maintenance. It is also entirely possible to build an automobile so light in weight that its operation would be dangerous on the open highway under extreme wind conditions.

Recent prophecy has also included mention of a complete molded plywood body. To date, the methods by which resin bonded plywood has been formed into compound curvatures has been, to say the least, costly and slow. Let us continue to remember the maintenance problem. The damaging of fenders and other body parts would still require replacement rather than repair.

As the world gradually emerges from war production to peacetime manufacture, we may find the rear engine type automobile as an ultimate and desirable possibility. The most widely used initial claim generally reads as follows: "Passengers will be moved forward for increased vision, more interior lounging room, more complete body streamlining." We have found that in re-arranging the exact same elements contained in the present motor car, namely the engine, passenger, and the luggage compartments, over the same specific wheelbase, we cannot, materially, increase the lounging room.

In the modern automobile, the muffler systems and insulation materials have done a most acceptable job (of eliminating engine noise, heat, and fumes).

Rear engine design is purported to offer far greater traction over the rear driving wheels, but it is also possible that this might reduce the weight over the front wheels to a point where satisfactory steering characteristics would be reduced. In driving a present-day station wagon with a full passenger load well to the rear, a light feeling in the front end often results. This is alarming to the driver, is apt to produce side sway, and could result in serious accidents.

The rear engine car, with its re-located power plant, promises to eliminate the need for drive shaft tunnels and the car can then be lowered to a somewhat greater extent. Lowering the vehicle below a certain point, however, we may go to the extreme when consideration is given to entry and exit with existing curb heights.

It is reported that smaller air cooled engines, requiring less space, will ultimately be utilized, and that the additional room provided can be thrown into the passenger compartment. This same additional room would be available in the conventional front engine car over the same wheelbase utilizing this same small engine.

I fear the greatest contribution of the rear engine type car, from the standpoint of the stylist, is the ability to obtain the teardrop silhouette—the more nearly single aerodynamic mass that is supposed to personify the zenith in automotive body design. If the consumer is propagandized into thinking that this war and the amazing strides in war materiel production have somehow meant that we could bridge a design decade in the passenger car, we may have a disillusioned body of people to whom we must make those all important postwar sales in an effort to maintain to some degree the high level of employment now enjoyed.

The Practical Postwar Car

William B. Stout

(CONTINUED FROM PAGE 119)

want to go down, you take your foot off the throttle, exactly the same as in a car if you want to go up a hill or coast down a hill.

If this control could be accomplished in an airplane, then we would not have the inherent fear of going into a cloud or getting above the overcast if we were not instrument pilots, for even if we couldn't use instruments the plane would do the flying and we would do the steering. Once such an airplane is possible and feasible and simplified to a low cost point, then the motor car of tomorrow will take wings.

We expect light wing load plane pilots to ride over bumps that jounce them up and down in the air 30 ft. at a time and like it. Waldo Waterman's plane of 1934 had wings that were hinged and arranged with shock absorbers so that when a sudden gust hit the wings they would bounce like a spring. This arrangement gave the passenger comparatively few bumps, and our private owner planes must give attention to this and spring the wings in some way or other to spill the air or relieve the wings when a cold bank gets on the way. If we spring the wings individually, then we can take them off individually, and they should be small enough so that we can store them with whatever control surfaces they have on the motor car itself and take them with us if necessary, or we can park the wings at an airport and drive back and pick them up later. This flying vehicle must be of airplane type construction.

I do not think that any airplane company today is seriously thinking of starting out in production in competition with motor car manufacturers in their own field. But even the motor car men will admit that airplane manufacturers would be foolish not to start a development of the type of air-ground vehicle that fits this air field. If a private owner plane is to be sold to the public, it will have no market of any size above $2,000 and you cannot build much airplane of standard type for that. There is a great advantage in having to make it for this cost, because it forces simplicity and straight thinking, and throws out all gadgets which have been too prevalent in past government-dictated designs.

Iron Ore Shipments Gain

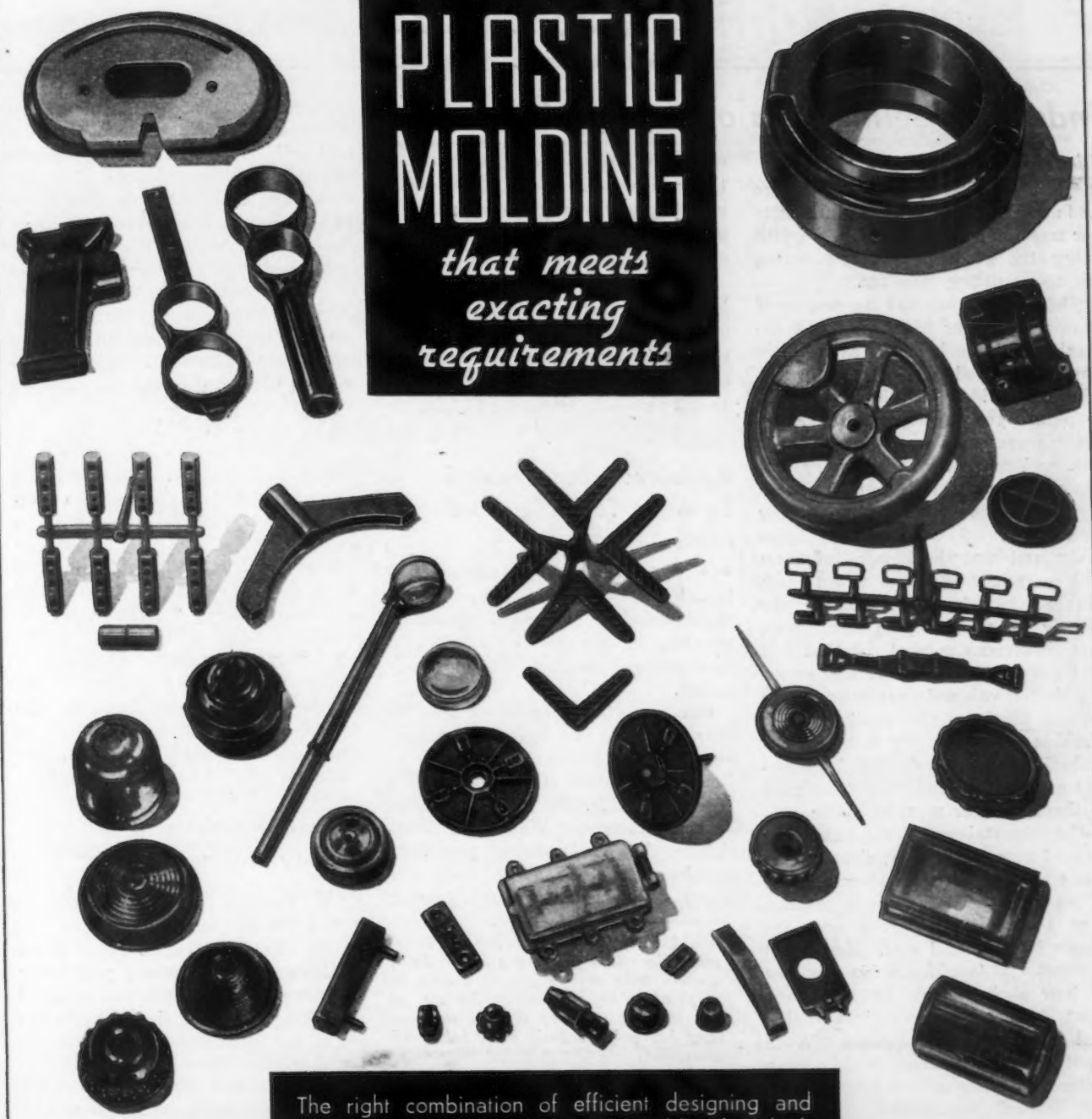
Washington

• • • **Setting a record**, iron ore movements from the opening of Great Lakes navigation up to May 22, totaled 13,297,099 tons, as compared with a total of 8,965,090 tons up to the same date in 1943, an increase of 4,332,009 tons, according to ODT. Officials pointed out that the large increases in shipment of ore, grain and coal over last year's movements are due principally to earlier opening of navigation and more favorable operating conditions on the Lakes this year.

Precision

PLASTIC MOLDING

that meets exacting requirements



The right combination of efficient designing and engineering assures you precision molding from high quality thermoplastic materials. Your exacting requirements are met promptly, efficiently and accurately, from small intricate designs to large 18 oz. moldings. Complete complementary equipment to answer your demand for plastic moldings, including complete dash panels, garnished moldings and similar trim.

Due to the allocation control of plastic materials, our production is at present restricted to direct war and essential civilian work.

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The METAL SPECIALTY Co. PLASTIC DIVISION

MAIN OFFICE AND PLANT • ESTE AVENUE • CINCINNATI OHIO

MACHINE TOOLS

. . . News and Market Activities

Industry Feeling Loss of Young Men

Cleveland

• • • **A combination** of labor shortage and uncertainty of Army requirements for machine tools is charged here with being the greatest problems facing the tool building industry.

The industry has had the respite of having men over 26 classified as deferable and the industry as a whole has been termed essential, yet the loss to date is said to have been too great to permit truly full scale production such as was had a year or two ago.

A spokesman for the industry who has a good general view of the industry's problems states that too many men under 26 have already been taken and that the balance of them will go soon. While it would seem that no industry would bank very heavily on men of this age group, this spokesman pointed out that this was the age group where the greatest initiative and versatility was found. Much of the credit for the machine tool industry's recent record of building 13 years' normal production of tools in about three years goes to these younger men, he said.

The uncertainty of the exact nature of new military requirements is also a bugaboo. The number and type of machines needed poses a problem even though the ultimate uses are known in a general way. Each shell contractor, it is said, has his own idea of how shells should be made and what sequence of operations is the best so that the requirements of each plant can and do vary widely even though the same contract is in store for several contractors. Without some definite information the tool builders are reluctant to place any investment or rearrange their shops much to accommodate work that can't be estimated. Labor supply, subcontracting of parts orders, shop conversions and re-engineering all await clarification.

In this respect it was pointed out that the industry first became aware of the new Army tool requirements about April 10 and still has only a hazy idea as to what is expected of it in specific production.

Since pool ordering of needed tools by the Army seems to be out of the question, the tool builders are pleading to be permitted to actively solicit orders for tools from civilian industries on a price and delivery later basis so that a firm backlog can be had which would reassure any reconversion or added investment required now to produce the Army's requirements.

The industry would also like to know how many idle government owned tools are going to come to light soon to fill a part of the Army's new tool requirements and reduce the load on the industry. Only 8000 tools, approximately, turned up so far in the incomplete returns of the WPB idle tool poll, but estimates of a possible 25,000 continue to circulate. The machine tool industry feels that many of the tools so discovered may prove to be old, obsolete derelicts which should be scrapped and thus will be of little aid. One lathe listed as "government owned, idle and available" here in Cleveland, for example, turned out to be 23 years old. It was listed at $1950 for resale and was actually worth about $300.

Advisory Group Created To Assist Tool Warehousing

Chicago

• • • **An advisory committee** from industry has been created by the Chicago Ordnance District to assist in warehousing machine tools and raw materials released by contract termination.

Members of the committee are: H. Perry Phelps, vice president, Clearing Industrial District, Inc.; Harry D. Crooks, president, Crooks Terminal Warehouses; H. F. Pratt, manager, Federal Emergency Warehouse Association; T. F. Donahue, president, Donahue Steel Products Co.; and Harry Christensen, assistant general manager of sales, A. M. Castle & Co. Four members of the Chicago Ordnance District staff will also serve on the committee.

The district already maintains two warehouses, one in Gary, Ind., and one in Milwaukee, for the storage of government owned machine tools that are not currently needed for war production. As the war progresses and contract terminations increase, the activities of the new committee are expected to expand to formidable proportions.

SMITH MOBILE GUN: *British Tommies place into position a Smith 3-in., smooth bore mobile gun at a base in England. The outstanding feature of the piece is its easy maneuverability. Gun has only recently been taken off secret list.*

Report Improvement in Quality of Diamond Dies

Washington

• • • **Steady improvement** in the quality of small diamond dies required to draw superfine wires, principally for electronics products, was reported by WPB officials at the recent meeting of the Small Diamond Dies Industry Advisory Committee. WPB representatives also brought out at the meeting that while requirements continue to be heavy, facilities are available to maintain the present level of wire and die production. Some deferments from military service of highly skilled young diamond die specialists have been obtained, but the officials emphasized in this connection that adequate quality and supply will depend upon continued employment of these skilled workers.

Physicists from the National Bureau of Standards discussed current research into improved methods of production and described the assistance made available to industry through reports and demonstrations on die contours, diamond powders, electrical spotting of diamonds and measurement by interference method.

Retracting and Repositioning Work Within .0002 OF AN INCH—By Push Button

DEVLIEG

No. 3A
3" Bar

JIGMIL

Arrow shows direction of retracting and repositioning movement

The most frequently needed function in a precision boring machine is that of retracting the work to facilitate measuring and tool setting.

In the DeVlieg Jigmil, this function is automatic—by fingertip control. Operation of a push button unlocks the table and moves it by rapid traverse to the desired position for measuring. For repositioning, operation of a single push button will cause the table to return to its cutting position by rapid traverse, stopping and locking automatically. Uniformity of selected position for stopping and locking is dependable within .0002".

The DeVlieg Jigmil is a new type machine—has the spacing accuracy of a Jig Borer — Performance Qualities of a Milling Machine—Convenience and Flexibility of a Horizontal Boring Mill. All control is so centered and organized that the operator never has to take his eyes off the work.

Thus, the Jigmil fulfills the machine tool ideal—a powerful and accurate extension of the operator's hand.

Many machines show 75 per cent greater average daily productivity.

DE VLIEG MACHINE COMPANY

450 FAIR AVE. FERNDALE (DETROIT) MICHIGAN

Write for Circular

DEVLIEG MACHINE TOOLS

NON-FERROUS METALS

. . . News and Market Activities

Tin Content for Solders Modified

• • • **Rules governing the use** of tin in solder and bronzes have been modified, effective June 6, WPB announced.

In announcing the changes, Mr. Erwin Vogelsang, director of the Tin-Lead Division of WPB said: "The current revision of Order M-43 governing use of tin in solder and bronzes is a rationalization and not a relaxation. The need for conservation of tin is still very pressing, and will continue so as long as the major source of our normal tin supply in the Far East remains in enemy hands. Tin is the only metal today in less supply than before Pearl Harbor."

"The changes in order M-43 affect primarily the regulations governing the use of solder and the use of tin in bronzes. The latter use, incidentally, has stepped from fourth to first place as a consumer of tin. Also, because of the growing scarcity of suitable tin bearing copper base alloy scrap, more new tin has to be supplied to ingot makers and foundrymen so that they can maintain the high production rate needed for castings to fill Navy and Maritime construction programs.

"In order that users and manufacturers may follow more readily the various permitted uses, which were set forth in Schedule 1, the amended order splits the schedule into four parts. The new Schedule 1 covers miscellaneous items, Schedule 2 covers solder applications; Schedule 3, babbitt, and Schedule 4, the use of tin in brass and bronze alloys. The 'Implements of War' clause, which formerly excepted military items from restrictions, has also been rewritten so that the restrictions apply to all schedules unless different specifications of the various government procuring agencies require a higher tin content than provided for in the new schedules.

"In setting up the solder schedule, we have endeavored to check very carefully those applications which use large quantities of solder. Where experience has proved that a low tin content solder is satisfactory, we have specified the lowest practical tin content solder. In other cases, where it has again been definitely proved that a higher tin content solder will use no more tin per unit than a low tin solder, and, further, that the higher tin content solder will produce a superior item and reduce the manhours per item, we have specified the higher tin content solder."

"Specific tin content solders have been regrouped for specific applications. The purchaser must certify that the solder is to be used solely for a specific purpose and that the tin content of such solder conforms to the restrictions and provisions of General Preference Order M-43. Some of these permit a lower tin content and some higher than in the present order. The automotive radiator industry has been placed on an average tin content basis per unit. The averages permitted are in line with present practice and will entail the use of no more tin per unit than is at present used. They should result in an overall saving of tin.

"Those applications where large quantities of solder are used are fairly well covered in the various specific exemptions. For the relatively small quantity of solder used for other than specified applications the tin content of solder is specified as a 30 per cent maximum instead of 21 per cent, as in the present order. This was done as a result of experiments which definitely proved that the 21 per cent solder, when used with a 'hand soldering' outfit, is not satisfactory for general use and, instead of conserving tin, actually is wasteful."

•

Copper Scrap Price Change

• • • **OPA announced** that effective May 23, the purchase price for copper scrap was fixed when a consumer shows he cannot obtain it because his specifications are such that the seller cannot afford to prepare the scrap for him under existing price ceilings. The copper scrap regulation at present permits the seller to add a special use premium of 1¼c. a lb. to the established maximum price on material that has been prepared to meet the consumer's specifications and is suitable for his direct use without further preparation. However, the sale must be to a consumer other than a copper refiner, a brass and bronze ingot manufacturer, a ferrous or nonferrous foundry or a brass mill.

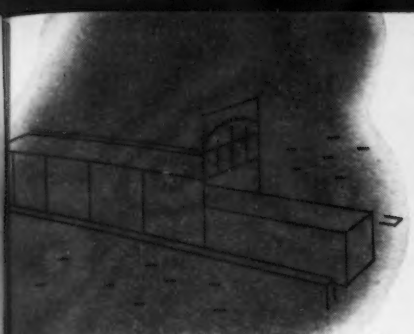
The action taken does not change this provision, but covers a situation where the special use premium, due to new requirements and specifications of consumers qualified to pay it may be inadequate to cover the added costs. A consumer should apply to the OPA Non-Ferrous Metals Branch, Washington 25, for the establishment of the price he may pay for such material.

Total Slab Zinc Smelter Output (All Grades) 1943-1944, Net Tons

	Stock at Beginning	Production	Total	SHIPMENTS Domestic	SHIPMENTS Export & Drawback	SHIPMENTS Total	Stock End of Period	Unfilled Orders End of Period	Daily Average Prod.
1943									
January	89,458	83,870	173,328	66,925	10,296	77,221	96,107	69,426	.....
February	96,107	76,667	172,774	66,552	8,210	74,762	98,012	66,920	.....
March	98,012	83,787	181,799	66,111	9,922	76,033	105,766	62,879	.....
April	105,766	81,057	186,823	73,131	5,650	78,781	108,042	60,260	.....
May	108,042	82,399	190,441	75,225	4,201	79,426	111,015	60,212	.....
June	111,015	78,865	189,880	68,271	5,920	74,191	115,689	57,879	.....
July	115,689	80,249	195,938	67,549	3,229	70,778	125,160	51,819	.....
August	125,160	79,736	204,896	68,953	2,857	71,810	133,086	49,617	.....
September	133,086	79,361	212,447	68,180	980	69,160	143,287	49,147	.....
October	143,287	83,066	226,353	69,845	2,101	71,946	154,407	41,532	.....
November	154,407	79,834	234,241	73,739	1,769	75,508	158,733	41,031	.....
December	158,733	83,165	241,898	67,159	1,073	68,232	173,666	44,914	.....
		972,056		831,640	56,208	887,848			
1944									
January	173,666	84,066	257,732	60,489	3,148	63,637	194,095	48,203	2,712
February	194,095	79,894	273,989	61,238	1,458	62,696	211,293	48,350	2,755
March	211,293	86,037	297,330	83,116	1,327	84,443	212,887	32,519	2,775
April	212,887	80,405	293,292	75,284*	.....	75,284*	218,008*	32,058	2,680
May	218,008	80,497	298,505	80,148	235	80,383	218,122	29,634	2,597

*Revised

From American Zinc Institute



For long-cycle annealing, normalizing, stress-relieving or hardening of finished or semi-finished material.

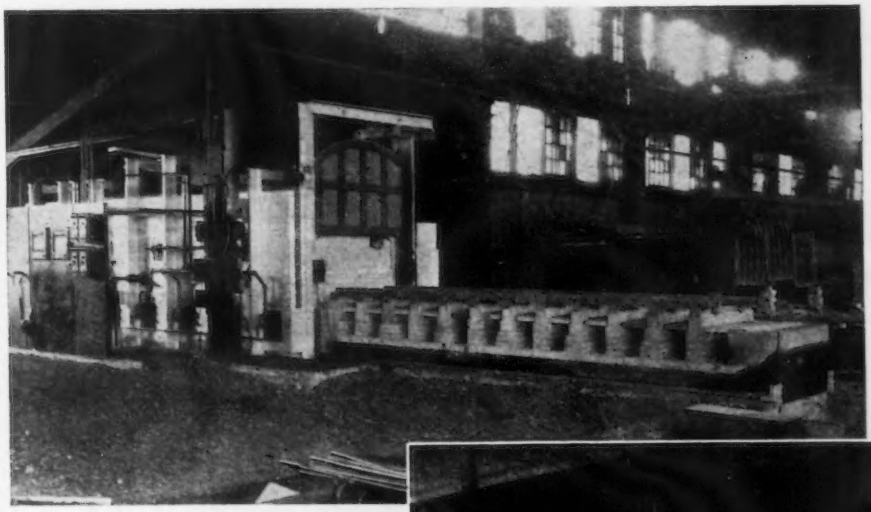
CAR-TYPE FURNACES *by* SALEM

ANY SIZE • GAS, OIL, OR ELECTRIC DIRECT FIRED AND RECIRCULATING TYPES BUILT TO YOUR SPECIFICATIONS

Salem can build any size or style of car-type furnace that you may need to facilitate or improve your production. If you have a question as to the most efficient type of furnace for your requirements, we will submit our recommendations based upon broad experience.

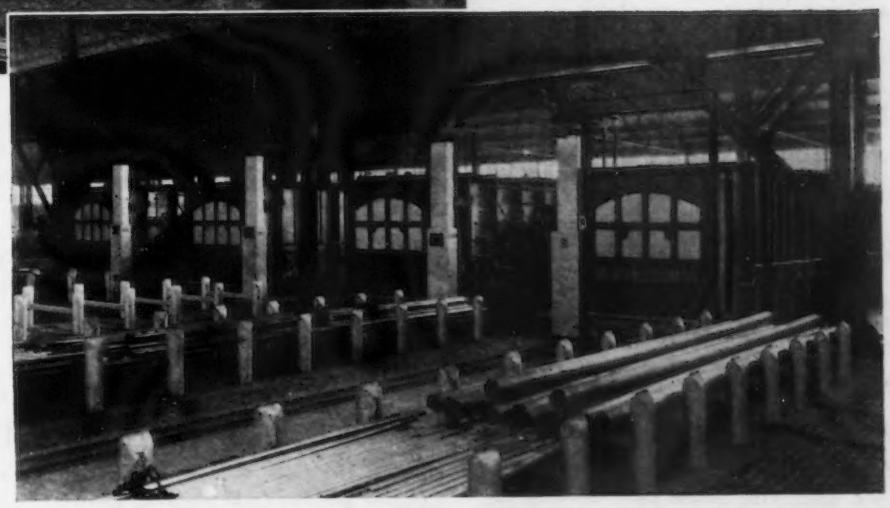
Chances are that we will have worked on problems similar to yours because in the past several years, we have been designing and constructing *all* types of industrial furnaces—car, batch, and rotary.

Built to withstand years of hard usage, designed to operate economically, and equipped with proper types of controls, Salem Furnaces will keep your heat treating quality *up* and your cost per piece *down*.



ANNEALING FORGINGS AND CASTINGS

Oil-fired, 9 years' service to date.



NORMALIZING STEEL TUBING

Gas-fired, in operation 9 years and going strong.

SALEM ENGINEERING COMPANY

Your inquiry to Salem will receive prompt attention

SALEM ENGINEERING CO. · SALEM, OHIO

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	12.00
Aluminum, deoxidizing grades	11.00 to 12.25
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	13.00
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$17.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$7.50
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	20.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	.

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1	
No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*
OPA Group 2	
Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
OPA Group 3	
Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]
OPA Group 4	
Automobile radiators	7.00
OPA Group 5	
Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated	
All S-type alloys (except 2S)	8.50
2S solids	8.00
High grade alloys	7.00
Low grade alloys	6.50
Borings and turnings	
High grade alloys	5.50
Low grade alloys	5.00
Plant scrap, mixed	
All solids	6.00
Borings and turnings	4.00
Obsolete scrap	
Pure cable	8.00
Old sheet and utensils	7.00
Old castings and forgings	6.50
Pistons, free of struts	6.50
Pistons, with struts	4.50
Old alloy sheet	5.50

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap	
Pure solids and all other solids, exempt	
Borings and turnings	8.00
Mixed, contaminated plant scrap	
Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

Alloy Steels—

MADE JUST SO FOR YOUR PROTECTION!

• Our steelmakers take pride in the thoroughness with which they watch over the production of Wisconsin Alloy Steels. When exact specifications are called for, nothing less will do.

We believe in that kind of thoroughness. Our customers are sold on it. They benefit from the quality product made possible by this manufacturing policy.

Wisconsin Alloy Steels meet every need. Our combined sales, service and manufacturing organization is always ready to discuss your steel problems with you.

WISCONSIN STEEL PRODUCTS

Open Hearth Alloy and Carbon Steel

Rounds, Flats, Squares, Bands, Skelp, Screw Steel

Agricultural and Special Shapes

Structural Angles, Beams, and Channels

Universal Plates

Cold Drawn and Turned Shafting

Pig Iron: Malleable, Foundry, Bessemer, and Basic

WISCONSIN STEEL COMPANY

AFFILIATE OF INTERNATIONAL HARVESTER COMPANY

General Offices: 180 North Michigan Avenue **Chicago 1, Illinois**

SCRAP

. . . News and Market Activities

Turnings Prices Hit New Low at Buffalo

New York

• • • **The most significant** development in the scrap market during the past week was the fact that steel turnings sales are reported in the Buffalo area for $13 a ton. This new low represents a decline of 75c. a ton during the past two weeks and is down from a ceiling of $14.25 a ton plus the 50c. per ton broker allowance.

The real significance in this price drop, however, is the report that one of the larger buyers in the Buffalo area is shooting for an even lower price than the $13 figure, and with the market as it is today, sales at this new low are quite possible.

What will develop from this is speculative, but with the supply of scrap better now than in many months, a general breakdown of prices in other grades is not inconceivable. Buying of practically all grades of scrap has reached a lull in the past few weeks, with supplies adequate to meet demands in every grade. Until this week, there was a rather heavy demand for the better open hearth grades especially in the Pittsburgh and Youngstown areas, but even these areas have reached the point where buying is in the selective stage.

The effects of a break in general scrap prices can be quite serious. Yards have had great difficulty in maintaining a semblance of operations because of the manpower situation, and if prices should break, with yards taking a licking on scrap, it might well be that yard operations will be curtailed somewhat. In fact, in the New England area, with labor conditions what they are, yards indicate that it is more economical to do as little business as possible.

Mill acceptances of scrap have become increasingly rigid during the past two months, and the shipments of scrap that have been rejected are quite substantial. Care is taken on inspections to insure that grading is up to specifications.

The hesitancy of steel producers to accumulate unusually large stocks of scrap now when scrap is more plentiful is based on the possibility of a short European war. There is some possibility that the European phase of operations might end suddenly, and heavy stocks of scrap at the mills will represent money tied up for months to come. Consequently, mills are trying to avoid heavy stocks, yet keep the flow sufficient to maintain operations in the mills.

One large eastern consumer is buying battlefield scrap direct from the services, rather than through dealers and brokers. This avoidance of the dealer and broker transaction is so the purchaser will know what is being purchased. Dealers frequently have mixed battlefield scrap with prepared domestic scrap, and have masked the battlefield scrap by this procedure. It is with the intention of being completely aware of the potential danger in handling and using battlefield scrap that this consumer has sought to buy directly from the services. When it is known that there is danger in the handling of such scrap, proper precautions can be taken, but such precautions are not generally taken when the scrap is included in shipments of domestic scrap without the buyer's knowledge.

•

PITTSBURGH—There were evidences this week that the supply of open hearth scrap has eased somewhat and all demands are being met without any difficulty. Scrap sales are continuing at a high rate, but the supply of heavy grades is sufficient. There is not much of a market for unprepared material, as neither the mills nor the scrap yards have the manpower to handle it, and both are steering clear of cluttering up with this type of scrap. Alloy solids and turnings are being sold on a nominal basis, with negotiations over each sale determining the price. Some alloy that is being sold at ceiling is sold under pressure and possibly on a reciprocity basis.

•

BOSTON—Mills are more rigid in accepting scrap. Rejections have become almost a foregone conclusion, say yards and brokers. Some mills have resorted to holding up shipments, including those of heavy melting steel. Scrap is moving to mills, however, but on a steadily diminishing scale. On the other hand, the movement by truck to New England consumers holds up well.

•

PHILADELPHIA — Buying here has reached a lull. Several mills have completely gone out of the market and a few others are taking scheduled shipments. As speculation as to the war's end rides high, most scrap consumers are hesitant to stockpile the material. Quantities of scrap are leaving eastern Pennsylvania on allocations to Bethlehem and Sparrows Point, as well as more distant areas. Contaminated turnings which have been rejected have found a purchaser at $5 f.o.b. shipping point. Demand for some grades of alloy solids has picked up slightly with SAE 4100 and nickel scrap leading.

•

BUFFALO—Steel turnings are being bought here for $13 a ton, a new low figure and a decline of 75c. in two weeks. When demand was good, turnings brought a ceiling of $14.25 plus a broker's allowance of 50c. One buyer now is reported shooting for an even lower figure than $13. Canal shipments of heavy melting continue to arrive from the New York area and deliveries to two leading consumers have reached 25,000 tons despite the slow start of navigation because of flood waters. Except for turnings, dealers report all items moving at a good rate.

•

CINCINNATI — Consumers of scrap tend more conservative with a number of the major outlets refusing to make heavy commitments in an effort to keep inventories within reason. Dealers indicate, however, that present material is moving without restriction, although the market continues to be quiet. With labor still a tremendous problem in the industry, yard interests are not aggressive in bidding for material requiring preparation.

•

BIRMINGHAM — Movement of open hearth grades in this district seems increasing even though consumers have limited the amount of freight they will pay. No demand exists here for electric furnace and foundry grades.

•

ST. LOUIS—While shipments from the country still are light, mills' inventories of scrap iron generally are better than for some time. Granite City Steel Co., which was down because of a strike, is taking scrap sparingly, and has not entirely lifted its embargo on shipments. This situation has helped other mills.

•

PITTSBURGH—There were evidences this week that the supply of open hearth scrap has eased somewhat and all demands are being met without any difficulty. Scrap sales are continuing at a high rate, but the supply of heavy grades is sufficient. There is not much of a market for unprepared material, as neither the mills nor the scrap yards have the manpower to handle it, and both are steering clear of cluttering up with this type of scrap. Alloy solids and turnings are being sold on a nominal basis, with negotiations over each sale determining the price. Some alloy that is being sold at ceiling is sold under pressure and possibly on a reciprocity basis.

U. S. Coast Guard--Official Picture

The Curtain Rises

. . . on ACT III of the world's greatest drama!

● *The big push is on!*

From a mighty armada of craft, hordes of Anglo-American troops stormed the Fortress Europa. And, as in all previous landings in this war, Higgins boats, manned by Navy and Coast Guard crews, were foremost in the news. For Higgins boats have become synonymous with invasion.

At the yards of Higgins Industries, where these landing craft are built, the *only* way to do a thing is the *fastest* way. That is why Higgins selected DeVilbiss Spray Equipment for applying the paint required for the protection of many parts of its famous invasion boats.

Just as these Higgins boats have become synonymous with invasion, DeVilbiss Spray Systems have become synonymous with speed and efficiency in painting and coating operations. Here – and in all of the United Nations—they are now saving precious time in war production to hasten the day of final Victory. And when that day comes, *you* can depend on DeVilbiss Spray Painting Equipment to help you produce your peacetime products faster, better – at lower cost.

THE DEVILBISS COMPANY, TOLEDO 1, OHIO
Canadian Plant: Windsor, Ontario

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Spray Systems

SPRAY EQUIPMENT • EXHAUST SYSTEMS • AIR COMPRESSORS • HOSE & CONNECTIONS

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles, Pittsburg, Cal; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.50	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on trucks. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing point (cents per gross ton) are: Chicago, 84c.; Pittsburgh, Brackenridge, 55c.; Detroit, 53c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, Pittsburg, 42c.; Seattle, 38c.; Buffalo, Claymont, Harrisburg, 36c.; Atlanta, Birmingham, 32c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Phoenixville, Bethlehem, Kokomo, Duluth and St. Louis, 28c.; Alabama City, Ala., 26c.; Minnequa, Colo., 22c.; Middletown, 14c.; Conshohocken, Sparrows Point, 11c.

*Basic open hearth and foundry grades, and auto springs and crankshafts, deduct 80c. per ton.

BASING POINT includes switching districts of city named.

Basing point	Switching districts:
Pittsburgh	Bessemer, Homestead, Duquesne, Munhall, McKeesport
Cincinnati	Newport
St. Louis	Granite City, E. St. Louis, Madison, Ill.
Chicago	Gary
Claymont	Chester, Pa.
San Francisco	So. San Francisco, Niles, Oakland

MAXIMUM SHIPPING POINT PRICE: Where shipment is wholly or partially by rail or vessel, or combination of rail and vessel, the scrap is at shipping point when placed f.o.b. railroad or f.a.s. vessel. For motor vehicle shipments scrap is at shipping point when loaded. Then maximum shipping point price shall be: (a) For shipping point located within a basing point, prices shown in above table for scrap at basing point in which shipping point is located, minus applicable switching charge deduction shown in paragraph above labeled "Switching Charges." (b) For shipping points outside basing point, price listed in above table hereof for scrap at most favorable basing point, minus lowest charge for transportation from shipping point to such basing point by rail or water carrier or combination. Where vessel movement is involved, in lieu of established dock charge or any cost customarily incurred at the dock, 75c. per ton must be included as part of deduction in computing shipping point price; 50c. at Memphis; $1 at Great Lakes ports; and $1.25 at New England ports. If no established transportation rate exists for a portion of movement from shipping to basing point, actual charge or cost customarily incurred by shipper in such portion of movement shall be included as part of deduction in computing shipping point price. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less than maximum prices for the corresponding prepared scrap. In no case, however, shall electric furnace, acid open hearth and foundry grades be used as the corresponding prepared scrap. A preparation-in-transit charge for unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced less $2; 75 to 85% Fe less $4; under 75% Fe less $8 per ton. Mill scale less $8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1% oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5% oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c. mill scale, $8 less than No. 1 heavy melting.

Tool Steel Scrap Prices (MPR 379)

	SEGREGATED Solids Per Lb. Cont. W	SEGREGATED Turnings Per Lb. Cont. W
Type 1. 12% min. W, 1% max. Mo	$1.80	$1.60
Type 2. 5 to 12% W, 1% max. Mo	1.60	1.40
Type 3. 1 to 5% W, 1.5% max. Mo	1.25	1.25
*Type 4. 7% min. Mo, 2% max. W	0.125	0.105
*Type 5. 3.5 to 6% Mo, 4.5 to 6% W	0.135	0.115

UNSEGREGATED SOLIDS
$1.50 per lb. contained W if 5% or more.
$1.15 per lb. contained W if 1 to 5%.
$0.80 per lb. contained Mo if 1.5% or more.

UNSEGREGATED TURNINGS
$1.30 per lb. contained W if 5% or more.
$1.00 per lb. contained W if 1 to 5%.
$0.70 per lb. contained Mo if 1.5% or more.

If both W and Mo are within ranges, payment may be for both W and Mo content.

*Per lb. of scrap material.
If segregated, a premium of $1.50 per lb. of contained Co allowed if Co content is 3% or over. No scrap considered segregated if Co content ranges between 0.5 and 3%.
If Cu or Ni content over 0.25%, price shall be reduced by 50%.
If 500 lb. or less is sold, either segregated or unsegregated, price shall be reduced 2c. per lb. of scrap material.

Cast Iron Scrap

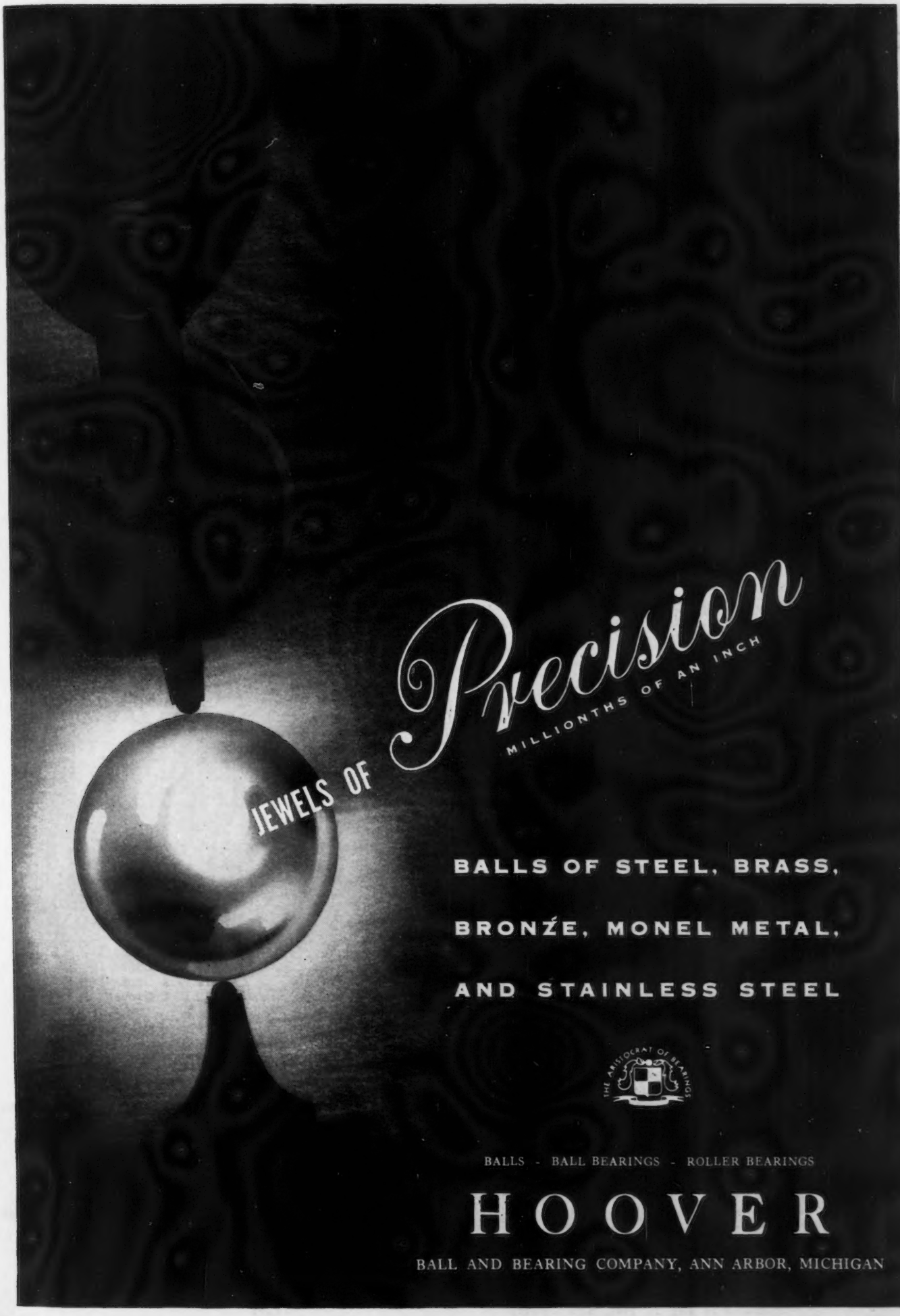
Maximum on-line price, per gross ton, for any of the following cast grades will be the price shown at the highest priced zone in which the railroad operates or is located.

	Per Gross Ton		
	Zone A	Zone B	Zone C
Cast Iron, No. 1	$18.00	$19.00	$20.00
Cast Iron, No. 2	17.00	18.00	19.00
Cast Iron, No. 3	14.50	15.50	16.50
Cast Iron, No. 4	13.25	14.25	15.25
Cast Iron Brake Shoes	13.25	14.25	15.25
Malleable	20.00	21.00	22.00
Wheels, No. 1	18.00	19.00	20.00

Zone A includes Mont., Idaho, Wyo., Nev., Utah, Ariz., and N. M. Zone B includes N. D., S. D., Neb., Colo., Kan., Okla., Texas, and Fla. Zone C includes all states not named in zones A and B, and includes switching district of Kansas City, Kansas-Missouri.

For cast, an in-transit preparation fee will be applicable only for preparing Cast ron No. 3 into Cast Iron No. 1, for which the maximum preparation fee shall be $3.50 per gross ton. (Previous dealer fee was $2.50.)

CAST IRON GRADE DEFINITIONS: Cast Iron No. 1—Cast Iron scrap such as columns, pipe, plates and/or castings of miscellaneous nature, but free from stove plate, brake shoes, and/or burnt scrap. Must be cupola size not over 24 x 30 in. and no pieces to weigh more than 150 lb. Free of foreign material. No. 2—Cast iron scrap in pieces weighing over 150 lb. not more than 500 lb. and free from burnt cast. No. 3—Cast iron scrap in pieces over 500 lb., includes cylinders, driving wheel centers, and/or all other castings. Free from hammer blocks or bases. No. 4—Burnt cast iron scrap such as grate bars, stove parts, and/or miscellaneous burnt scrap. No. 5—Driving and/or car brake shoes of all types except composition filled. Malleable—Malleable parts of automobiles, railroad cars, and locomotives. No. 7—Wheels, No. 1, includes cast iron car and/or locomotive wheels.


JEWELS OF Precision
MILLIONTHS OF AN INCH
BALLS OF STEEL, BRASS,
BRONZE, MONEL METAL,
AND STAINLESS STEEL
THE ARISTOCRAT OF BEARINGS
BALLS - BALL BEARINGS - ROLLER BEARINGS
HOOVER
BALL AND BEARING COMPANY, ANN ARBOR, MICHIGAN

Comparison of Prices . . .

Advances Over Past Week in Heavy Type; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	June 13, 1944	June 6, 1944	May 9, 1944	June 15, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	June 13, 1944	June 6, 1944	May 9, 1944	June 15, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	25.11	25.11	25.11	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	31.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$7.00	$6.50
Foundry coke, prompt	8.25	8.25	8.25	7.50
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 186-195.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
June 13, 1944	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

WHY *Salt Baths* ARE SPECIFIED!

It is universally admitted today that no branch of metal-working has made greater progress than heat treatment. "All purpose" furnaces are unknown, but it is a fact that electric salt bath furnaces show a wider range of usefulness than any other type. . . .

That means, specifically, Ajax-Hultgren furnaces, of which more have been installed than all other electric makes combined.

Salt bath treatment is specified in all its astonishing variety, from 350° to 2400° F. because it "controls the atmosphere" by eliminating it. . . . A salt film seals out deleterious gases up to the instant of quenching, and an Ajax furnace produces more completed pieces, with fewer rejects, than any radiation or forced convection unit of the same size. . . .

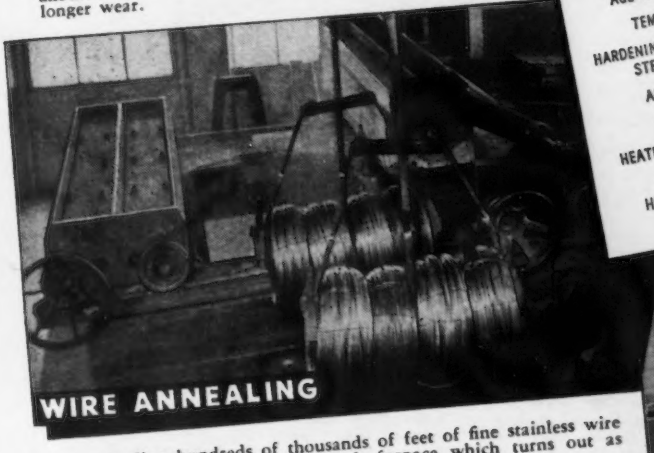
There are hundreds of applications* for which Ajax furnaces are specified. A few are shown below. Data is given in 1944 Catalog 107-B which may be had by writing: **AJAX ELECTRIC CO., Frankford Ave. at Delaware Ave., Philadelphia 23, Pa.**

Conveyorized neutral hardening bath for treating spline shafts, followed by timed quench, and quench in another salt bath (martempering). Shafts show 30% longer wear.

HERE ARE THE KEY PROCESSES TODAY...

CARBURIZING
•
SIMULTANEOUS BRAZING & CARBURIZING
•
NEUTRAL HARDENING
•
CYANIDE HARDENING
•
SELECTIVE HEATING
•
AGE HARDENING
•
TEMPERING
•
HARDENING HIGH-SPEED STEEL TOOLS
•
ANNEALING
•
BRAZING
•
HEATING FOR FORGING
•
ISOTHERMAL HEAT TREATMENT

Carburizing ordnance parts in one of the largest war plants in the East. Uniform case, freedom from distortion, ability to treat selectively, are all characteristic of Ajax units.



Process annealing hundreds of thousands of feet of fine stainless wire in the Ajax-Hultgren electric salt bath furnace which turns out as much annealed wire as 6 continuous annealing furnaces.

The world's largest electric salt bath furnace, used for heat treatment of aluminum alloy sheet, sections, and large parts. Uniformity of heating avoids distortion.

*THERE'S AN AJAX INSTALLATION NEAR YOU!

THE AJAX ELECTRIC SALT BATH FURNACE
HULTGREN

ASSOCIATE COMPANIES:
AJAX METAL COMPANY, *Non-Ferrous Ingot Metal for Foundry Use*
AJAX ELECTRIC FURNACE CORPORATION, *Ajax-Wyatt Induction Furnaces for Melting*
AJAX ELECTROTHERMIC CORPORATION, *Ajax-Northrup Induction Furnaces for Melting, Heating*
AJAX ENGINEERING CORPORATION, *Ajax-Tama-Wyatt Aluminum Melting Furnaces*

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applise to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Provo, Utah	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢			2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢			3.70¢	3.15¢	3.39¢	3.37¢
Galv. Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢			4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢			4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢										4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢			2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)						2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢								2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)						3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10						5.36¢	5.32¢
.50 Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60							
.75 Electro Tin Plate, Box	$4.65		$4.65						$4.75							
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢				4.05¢[13]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40							
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢		2.80¢	2.25¢	2. 49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢		2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢		2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢		c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)			(Toledo = 2.80¢)				2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)							2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢								3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.60¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢		4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95		4.15¢		3.70¢	3.58¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.45¢		2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)									
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)									
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)									
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)									
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)		(Duluth = 2.65¢)				3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.															
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)						3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢							2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto; Phoenix Iron Co. $47.00 mill. Geneva Steel Co. $64.64 f.o.b. Pacific Coast Ports.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich. Geneva Steel Co. $58.64 f.o.b. Pacific Coast ports.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts. (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing points.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp., $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. and Geneva Steel Co. $3.20 Pacific Ports; Central Iron & Steel Co. $2.50 basing points; Granite City Steel Co. $2.35 Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co., $2.35 Chicago; Calumet Steel Dic., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill. Milton Mfg. Co. $2.75 f.o.b. Milton, Pa.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight ville; Medart Co. in certain areas, Chi- Buffalo to Readville, Mass. f.o.b. Readcago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. shipped outside Ala., Mississippi, Louisiana. Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

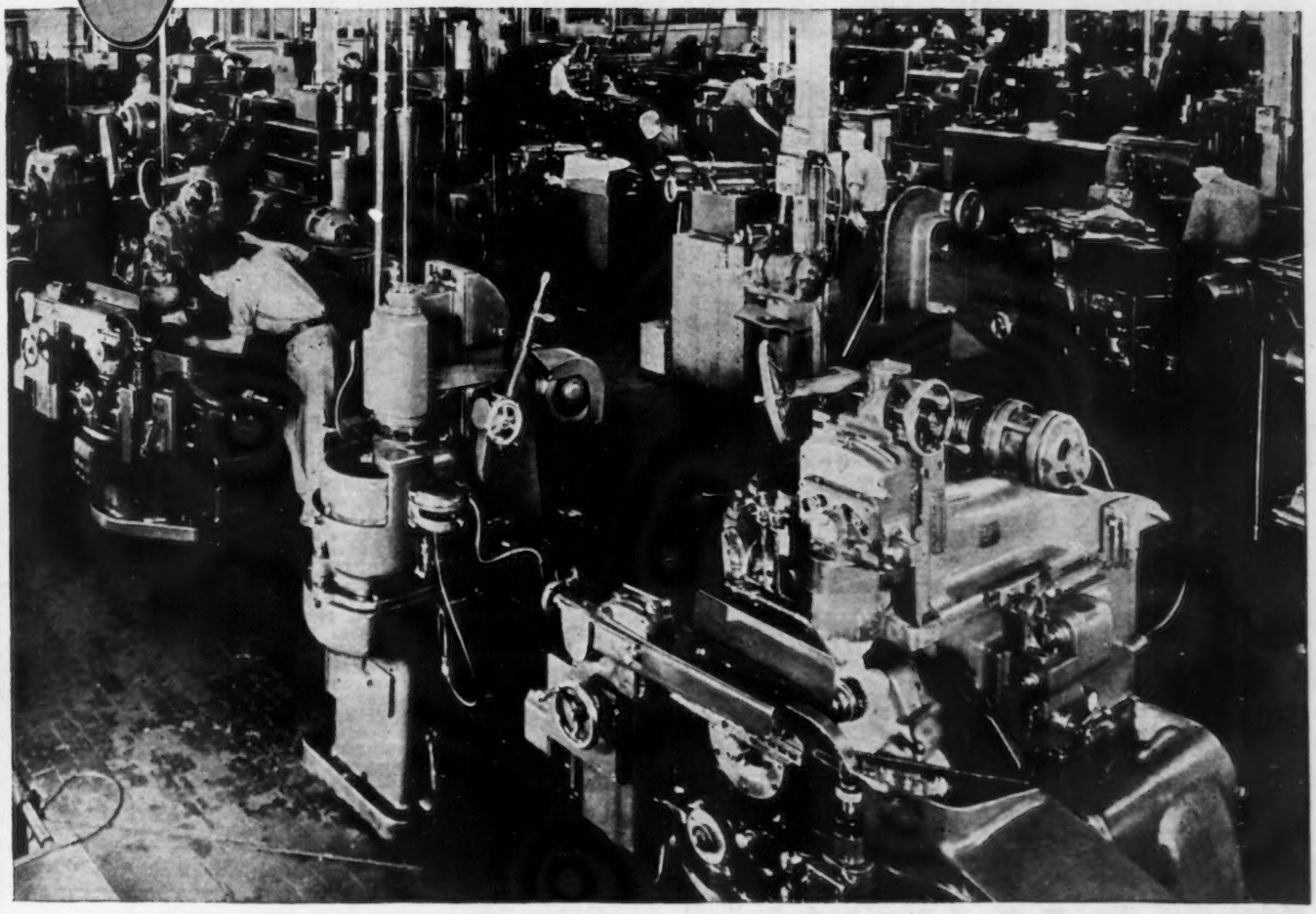
Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

CORRECT Lubrication means Better Maintenance



CORRECT lubrication makes for better maintenance by preventing excessive wear.

Sinclair provides a range of specialized hydraulic, spindle, gear, and general purpose oils for *correct* lubrication of *MACHINING* equipment . . . also a widely diversified line of cutting oils adapted to every problem.

Where overtime heavy duty operation threatens excessive wear and machine stoppages there is a lubrication problem. Consult us about it.

(Write for "The Service Factor" — published periodically and devoted to the solution of lubricating problems.)

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-48 Ann.
**Philadelphia	3.518	4.872[6]	5.018a	3.922	4.772	3.605	3.666	3.822	4.072	5.966	7.066	7.272	8.322
New York	3.590	4.613[3]	5.010	3.974[6]	4.772	3.768	3.758	3.853	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.885	3.971	4.002	4.065	4.165	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.00[4]	3.70	4.659[17]	3.609	3.661	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.811[3]	3.811[3]	3.761[3]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.68	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.95	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[2]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.06[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.171[8]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS
(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar-Strip	Billets, Blooms and Slabs	Bars and Bar-Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35				.10c	$2.00		
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25c	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20				.40	8.00		
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20				.40	8.00		
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25			.65	13.00		
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40			.65	13.00		
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

Base Quantities

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 800 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(*) **Philadelphia:** Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

PRICES

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Provo, $11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton 54.00
Price delivered Detroit $2.00 higher; E. Michigan $3.00 higher.

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.
Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.
Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(*No. 5 to 9/32 in.*)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(*F.o.b. Pittsburgh, Bethlehem, Syracuse*)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

HOW TO LOAD & UNLOAD FREIGHT CARS 2 Faster

KRANE KAR — Mobile Swing Boom Crane

KRANE KAR transports the loads to and from the cars. You don't waste time maneuvering the vehicle . . . just operate the live boom from side to side with load on the hook. KRANE KAR reaches into the farthest recesses of the car to position or remove loads. For box, flat, or gondola cars.

USERS: Bethlehem Steel; Consolidated Steel; Columbia Steel; Pullman Standard Car Mfg. Co.; Ajax Steel & Forge; Boeing Airplane Co.; General Motors; Basic Magnesium; etc.

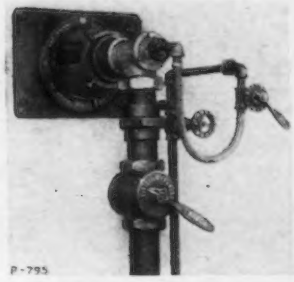
2½, 5, AND 10 TON CAPACITIES

Krane kar

SILENT HOIST WINCH & CRANE CO., 851 63RD ST., BROOKLYN, N.Y.

FOR ALL TYPES of INDUSTRIAL FURNACES

LOW AIR PRESSURE OIL BURNERS



NATIONAL AIROIL FUEL OIL - GAS BURNERS

Efficient . . . Economical . . . for firing Heat Treating, Forging Furnaces, etc.

The Type LAP, burning No. 1 to No. 6 fuel oils and using low air pressure for atomization, has a versatility that meets the exacting conditions of the metal working industries. Is of simple yet rugged construction . . . has wide operating range . . . is free from clogging. Available in six sizes with capacities up to 100 gals. per hour . . . manual or automatic controls. For more details send for Bulletin 65.

Steam Atomizing Oil Burners—Mechanical Pressure Atomizing Oil Burners—Low Air Pressure Oil Burners—Motor-driven Rotary Oil Burners—Industrial Gas Burners—Combination Gas and Oil Burners—Fuel Oil Pumping Units—Fuel Oil Heaters—Fuel Oil Strainers and other accessories.

NATIONAL AIROIL BURNER COMPANY, INCORPORATED

1271 East Sedgley Ave., Philadelphia 34, Pa.

ESTABLISHED 1912 INCORPORATED 1917

Fast Tough

Heavy feed at high speed spells doom to the ordinary hack saw blade; down-time for your machine, extra expense in money, man hours, and production. The MARVEL Hack Saw Blade, because it is positively *unbreakable* under these conditions, should be "a must" tool in every efficiently operated shop. A tough alloy steel back is electrically welded to high speed steel teeth, producing a blade that can be pulled to almost unlimited tension; can withstand extra heavy feeds and the heat and abrasion of high speed heavy duty sawing.

Heavy feed at high speed!

The same exclusive *unbreakable* feature of MARVEL Hack Saw Blades is also a feature of MARVEL Hole Saws, giving these saws the ability to stand up under abuse. MARVEL Hole Saws cut holes from 5/8" to 4½" diameter in stock up to 1⅛" thick. Usable in portable drill, drill press, or lathe tail stock.

Complete Range of Metal Sawing Machines

Being the largest exclusive manufacturer of metal sawing machines and blades, both hack saw and band saw type, we have the correct answer to your cut-off problems. Each MARVEL model has a distinct application, so write us and we will send our catalog, price, and recommendation for the saw to fill your requirements most efficiently. MARVEL sawing engineers are also available to discuss and analyze your cut-off work. (Without obligation of course)

ARMSTRONG-BLUM MFG. CO.
5700 W. Bloomingdale Ave., Chicago 39, Illinois, U. S. A.

FOR Pneumatic Conveying SYSTEMS

"R-C" Pneumatic Conveying Blower shown in photo has a capacity of 4,400 c.f.m. at 280 r.p.m., 4 lbs. pressure. V-Belt drive from electric motor.

"R-C" Positive Displacement Blowers are naturally adapted for pneumatic conveying systems because of their inherent ability to build up pressures needed to keep material moving in the conveying lines. Performance records show lowest power consumption. We specialize in building blowers to meet any capacity and moderate pressure requirement, but do not furnish complete systems.

PRODUCE, SHARE and PLAY SQUARE WITH FOOD

ROOTS-CONNERSVILLE BLOWER CORP.
406 Ohio Avenue Connersville, Ind.

Roots CONNERSVILLE SINCE 1854 — Rotary Positive BLOWERS

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$2.00 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	*Hot Rolled*	*Lap Weld, Hot Rolled*
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	Base per Keg	
Standard wire nails	$2.55	$3.05
Coated nails	2.55	3.05
Cut nails, carloads	3.85	....
	Base per 100 Lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	$0.67	$0.85
Fence posts, carloads	.69	.86
Single loop bale ties	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barbless wire	.70	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

Base discount less case lots

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	**U.S.S.**	**S.A.E.**
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts

	Consumer
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws

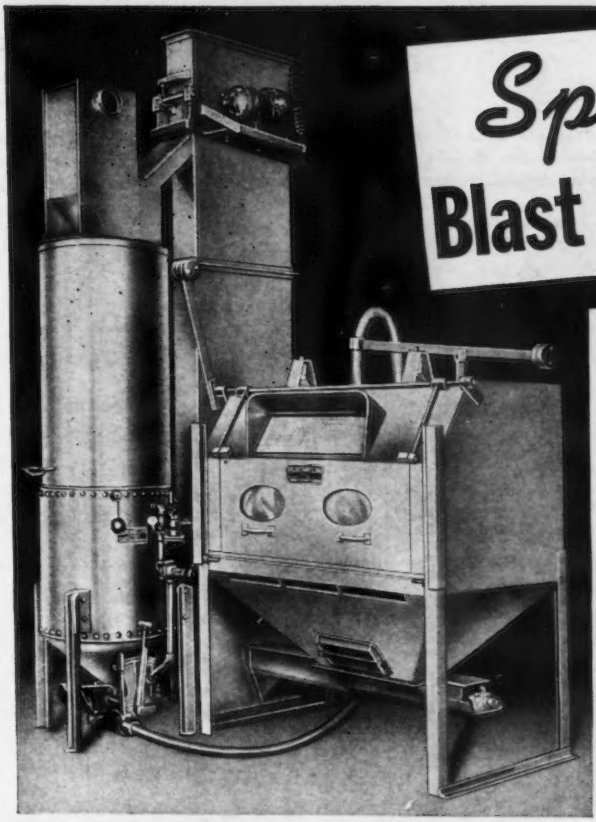
	Consumer Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00



Speedy Blast Cleaning

Ruemelin Blast Cabinet provides a fast cleaning action by direct pressure blast. Handles a great variety of jobs. Simple to operate. No skilled labor needed. Sanitary. Operator need not wear helmet. Front door loading. Saves footsteps and floor space. Low maintenance cost. No pits or foundation required. Shipped assembled for low installation cost. Handles all classes of abrasives. Over 1,000 in service in foundries, welding shops, steel treating plants, airplane factories, etc. Write for bulletin 32-B.

RUEMELIN MFG. CO.
3870 N. Palmer Street
Milwaukee 12, Wisconsin

RUEMELIN *Blast Cabinets*

A 4397-⅛

PERMANENT MOLD ALUMINUM CASTINGS

A Complete Service!

Design • Delivery • Quantity • Quality

Permanent Molds manufactured

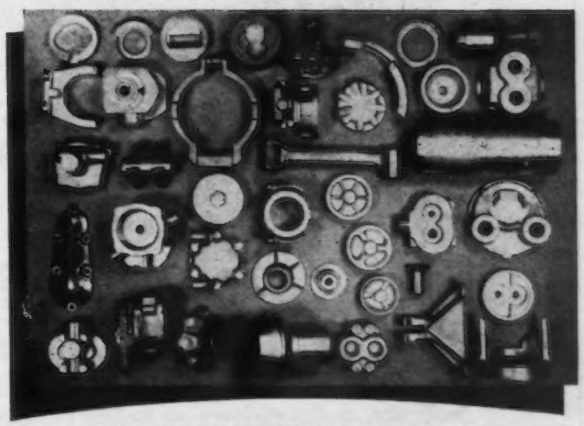
Aluminum Castings produced in any quantities

Heat Treated to all specifications

X-Ray and other inspection controls

Deliveries to meet all schedules

Send in your inquiries for war and civilian requirements.



DETROIT 8-254 Gen. Motors Bldg. CHICAGO 1424 A, Merchandise Mart BUFFALO 837 Potomac St.

NATIONAL ALUMINUM MFG. CO., PEORIA, ILL.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$26.00*	.....	.....
Brooklyn	*27.50*	*27.00*	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*25.11*	*24.61*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	.....*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.63*	26.13	*27.13*	*26.63*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

CRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable. Struthers Iron and Steel Co. may add another $1.00 per gross ton for iron from Struthers, Ohio, plant.

(2) Price shown is for low-phosphorous iron; high phosphorous sells for $28.50 at the furnace.

(3) E. & G. Brooke Co. Birdsboro, Pa., permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum power, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges. **Mo., Ala., and Tenn. producers—$13.35.

1 MARKAL PAINTSTIKS make clear positive, easy-to-read marks on any material—metal, lumber, rubber, plastics, glass, stone, etc.

2 MARKAL PAINTSTIK markings are permanent. They stay on. Sun and weather won't touch them.

3 Smeary paint buckets and brushes are out for the duration — and forever, too. Carry a MARKAL PAINTSTIK in your pocket; no mess, no fuss.

4 MARKAL PAINTSTIKS are made for cold, wet, dry, oily, or hot surfaces up to 1800 F. There's a specific type MARKAL PAINTSTIK for every marking job.

Write for Samples, Literature

Choice of Colors

MARKAL CO. 6-W. EAST LAKE ST. CHICAGO 1, ILL.
"Originators of Paint Sticks"

PRICES

REFRACTORIES
(F.o.b. Works)

	Per 1000
Fire Clay Brick	
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
	Per Net Ton
Chrome Brick	
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

CORROSION AND HEAT-RESISTING STEEL
(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

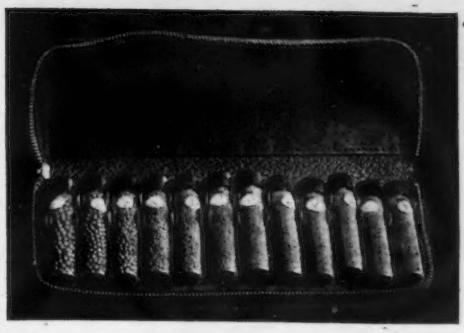
	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS
(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.



HEAT-TREATED STEEL SHOT

We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

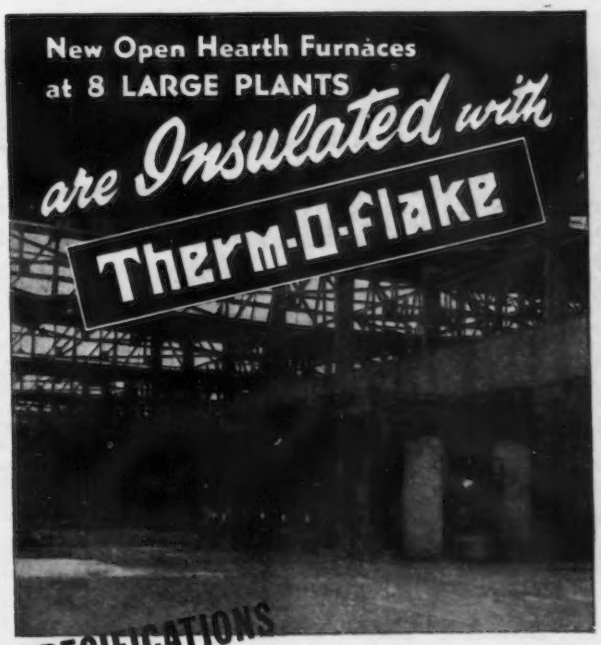
Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

HARRISON ABRASIVE CORPORATION

Manchester, New Hampshire

HEAT-TREATED STEEL GRIT



SPECIFICATIONS
for Greater Fuel Economy
Improved Working Conditions

Therm-O-Flake Coating Vertical walls — bulkheads — roofs — arches.

Therm-O-Flake Brick Flue Walls and Arch — Checker Chamber Walls. Slag Pocket Walls.

Therm-O-Flake Concrete Flue — Checker Chamber Hearth Bottoms.

Illinois Clay Products Company
JOLIET, ILL.

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INSULATION

PRECISION WORK ON SMALL PARTS

(up to 20 lbs.)

Induction heat-treating (30 KW)
External Grinding (up to 10" x 36")
Internal Grinding
Surface Grinding (plain and rotary)
Milling—vertical, horizontal, contour
Duplicating
Automatic lathe work
Etc.

For list of equipment, pictures and other information concerning plant write

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PERFORATED METAL

● **The uses of perforated metal are numerous and increasing. Industry requires it for a thousand purposes.**

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The Harrington & King Perforating Co.

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Eastern Office, 114 Liberty Street, New York 6, N. Y.

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si	8.90c.	9.05c.	9.55c.
90-95% Si	11.05c.	11.20c.	11.65c.

Spot sales add: .45c. per lb. for 50% Si, .3c. per lb. or 75% Si .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphoros or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.

PRICES

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten, 10,000 lb. or more...	$1.90
Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per usual freight allowances, per lb. contained Va.	
Open Hearth	$2.70
Crucible	$2.80
Primos	$2.90
Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal	$1.50
Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5	$1.10
Ferroboron, contract basis, 17.50% min. Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.	
2000 lb. to carload	$1.20
Under 2000 lb.	1.30
Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)	
Carload lots	25c.
2000 lb. to carload	26c.
Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)	
Carload lots	58c.
2000 lb. to carload	59c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis	
No. 1	87.5c.
No. 6	60c.
No. 79	45c.
Bortram, f.o.b. Niagara Falls	
Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.	
2000 lb. lots	$2.25
Under 2000 lb. lots	$2.30
Ferrotitanium, 40%-45%, f.o.b. 0.10c. max. Niagara Falls, N. Y., ton lots, per lb. contained Ti..	$1.23
Less ton lots	$1.25
Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload	$142.50
Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo.	95c.
Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo	80c.
Molybdenum oxide briquetes, 48%-52% Mo, f.o.b. Yangeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo	80c.
Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales	
Carload lots	14c.
Zirconium, 12-15%, contract basis, lump, f.o.b. plant usual freight allowances, per lb. of alloy	
Carload, bulk	4.6c.
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk	5.75c.
Ton lots	7.25c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.	
Car lots	8.75c.
Ton lots	9.25c.

Are your mechanical developments in the stage where you are searching for just the right kind of spring? Then call on B-G-R engineers for advice on choice of material, type of action, and correct design—for economy in manufacture and ease of operation. Be guided by B-G-R—it pays!

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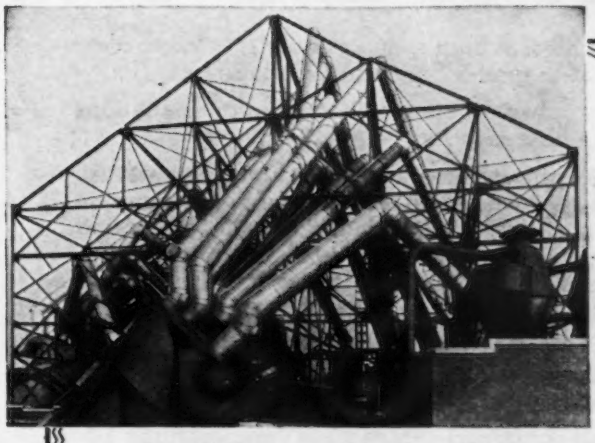
TWO PLANTS FOR SPRING SERVICE
DETROIT and ANN ARBOR MICHIGAN



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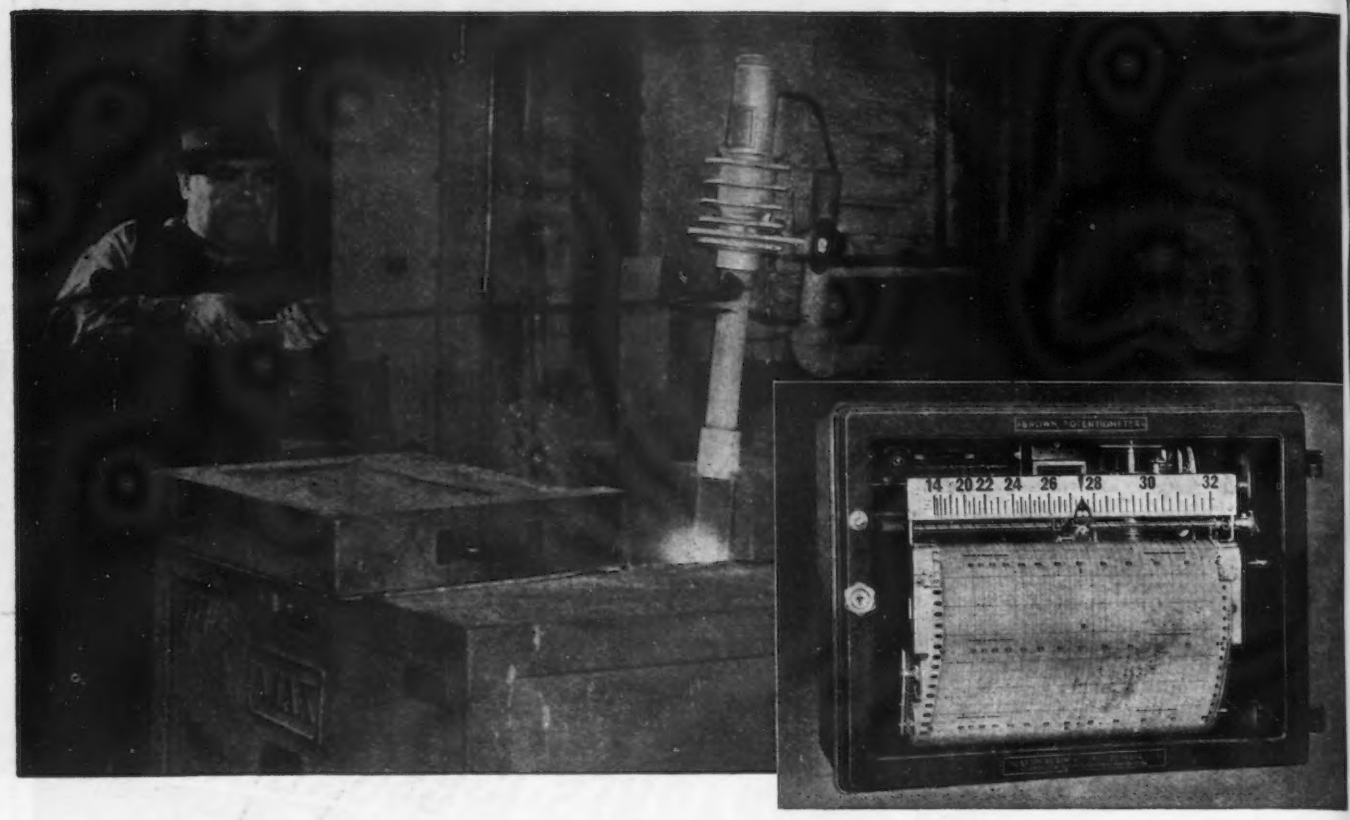


RADIAMATIC Solves Control of
HIGH SPEED SALT BATHS

Closer temperature control of high speed salt baths at lower costs is being accomplished at Lorenz & Sons, Inc., Philadelphia, Pa.

The above illustration is typical of many Radiamatic installations where thermocouple maintenance has been eliminated.

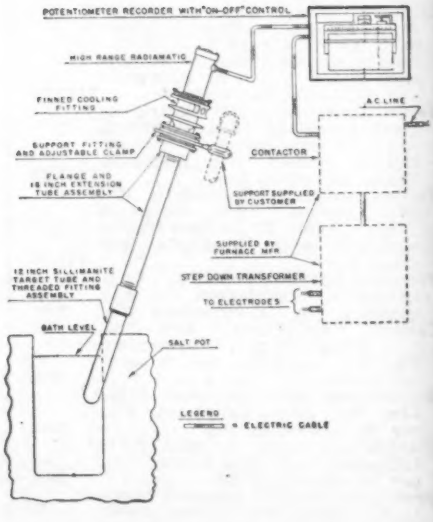
Users of Brown Radiamatic Pyrometers have found temperature measurement control by the radiation principle highly accurate and dependable. It safeguards against thermocouple protecting tube failure, which can cause serious damage to recording instrument if subjected to the high A.C. potential in salt bath. The use of a sillimanite target tube insures long life and makes it possible to continuously measure deep bath temperatures.

Extremely responsive — accuracy is unaffected by dust, dirt, fumes or corrosive atmospheres.

The Radiamatic is self-contained — measures temperatures beyond the range of conventional thermocouples—built-in compensator compensates for ambient temperature changes up to 250° F.

Water-cooling is unnecessary with the Radiamatic on high speed salt baths—easy to install—universal in application.

Write for Bulletin 5101—The Brown Instrument Company, *a division of Minneapolis-Honeywell Regulator Company*, 4483 Wayne Avenue, Philadelphia 44, Pennsylvania. Offices in all principal cities. 119 Peter Street, Toronto, Canada — Wadsworth Road, Perivale, Middlesex, England—Nybrokajen 7, Stockholm, Sweden.



BROWN RADIAMATIC PYROMETER